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Original Contributions.

THE PATHOGENESIS OF THE LOWER JAW.

BY G. V. I. BROWN, D.D.S., MILWAUKEE. READ BEFORE NATIONAL DENTAL ASSOCIATION, AT NIAGARA FALLS, JULY 28-31, 1902.

It is a primary law of nature that the forces which build and support all things, animate and inanimate, those which are constructive, may in turn become destructive elements. Thus in human life, cells active in cooperation with tissue repair, under pathologic conditions become disorganizing factors, active in the liquefaction of tissue. Irritation, that is essential for normal cell function, becomes in turn responsible for disease and its varied symptoms. Exercise and proper muscular action, all important to bodily health and to those metabolic changes upon which structural development depends, if carried to an extreme, are conducive to exhaustion, resulting in extensive tissue waste and loss of substance; or through perverted action they may become responsible for deviation of form, resulting in more or less deformity, instead of the symmetrical development which depends upon the equalization and proper direction of muscular strain.

The same principles, as applied to osseous development of the individual, are so elementary as to need no further reference at this time, and for the same reason it is unnecessary to continue, as might be done almost indefinitely, different illustrations of the truth of this maxim, which, applied directly to the lower jaw and the nervous and muscular mechanism by which it is operated, would warrant the following premises: *First.* The lower jaw is chiefly responsible for symmetrical facial development. *Second.* Perversion of its action must result in both facial and nasal asymmetry. *Third.* Antagonistic effort, resulting in normal occlusion, is the chief element in preserving the healthfulness and extending the usefulness of dental organs and oral tissues. *Fourth.* Interference, leading to malocclusion, want of occlusion or excessive occlusion, leads di-

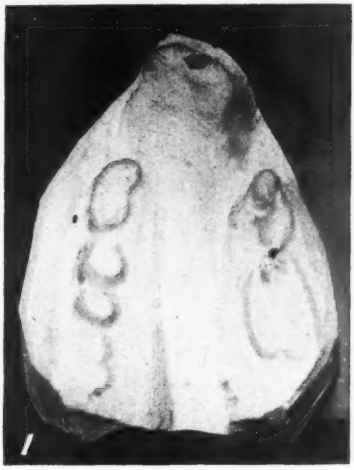
rectly to diseases resulting in tendency to dental caries, pericemental and alveolar diseases, shortens the period of dental usefulness and causes both local and general diseases of the nerve structures and nervous system. *Fifth.* Upon proper direction of occlusal force depends regularity of the dental arch. It is the guiding influence during the eruption of teeth to bring them into proper place. *Sixth.* Misdirection of this energy forces them out of line and increases the irregularity. *Seventh.* In cases of hare-lip and cleft palate deformity, the fissures are widened and the intermaxillary bone forced outward and forward, thus increasing the deformity and militating against this correction. *Eighth.* By undue stimulation of the central nervous system, through peripheral irritation, neuroses result much more frequently than is commonly supposed.

At birth the lower jaw is considerably larger than the upper, and the bones of the face are much smaller in proportionate development than those of the head. Ossification in the lower jaw precedes all of the other bones, except the clavicle, and during the first year will have united it into a single bone. Its wedge-shaped form, almost with the first breath, is forced against the non-resisting tissues, which will ultimately develop into the palate bones and the superior maxillary, these in turn crowding the correlated structures, destined to become with complete ossification the bones of the nose and face. In sucking, mastication, perverted or too constant antagonism, stimulated by nervous habits, a force, powerful from the beginning in comparison with the yielding tissues against which it is directed, is exerted, which continues to increase until in the adult development a strength is acquired that is capable of exerting a crushing force equal to at least two hundred and fifty and in some individuals more than three hundred pounds. It is but natural to conclude, under these conditions, that during the developmental stage the shape of readily-yielding bones in young children must be largely governed by this controlling power.

As an illustration of the effect of unopposed muscles upon the form and structure of the nasal septum, I would refer to Figs. 1 and 2, which show both cast and photograph of a typical case of neglected double hare-lip and cleft palate. Instead of a thin, almost transparent wall, it was found in this case that in order to restore natural form to the features nearly an inch and a half of solid bone, varying from one-third to one-half inch in thickness, had to be

removed. These are typical cases and could be multiplied by way of illustration almost indefinitely, if it were necessary to do so. The principles underlying the reason for these distortions of form in the abnormal character of bony growths are not so well understood as they ought to be, but the influence of the muscles of mastication, exerted upon and through the lower jaw, would seem to leave very little need to seek for another etiologic factor.

Orthopedic and orthodontic appliances calculated to correct deformity in older patients depend upon the well known principle that



steadily exerted pressure will bring about absorption at the point of irritation if not so severe as to cause acute inflammation. The osteoclasts employed in this office will, under favorable conditions, become osteoblasts or tissue-builders, to the end that the new and more desirable form will become permanent. Nature's orthopedic appliance works upon exactly the same principle. Therefore compression which will prevent or interfere with the development of the dental arch must compress the bones forming the nares and restrict the normal growth of those which form the nasal septum.

Dr. Black of Milwaukee in a paper before this Association last year summed up the etiology of deviation of the nasal septum so carefully that it is worthy of repetition at this time—"Taking into

consideration the development of the several bones involved, we find at birth the ethmoid consists of two lateral masses which are small and ill-developed. The horizontal and perpendicular plates begin to ossify at about the first year after birth, and the lateral masses become joined to the cribriform plates. The formation of the ethmoid cells, which completes the bone, does not commence until about the fourth or fifth year. The vomer, which consists of two laminæ, commences to ossify from a single center, beginning to coalesce at the lower part, but their union is not complete until after puberty. The superior maxillæ commence to ossify at a very early period, but the sutures between the palate processes persist until middle life. Thus the lower arch, with its two arcs, is fairly well formed at birth, with a joint at the junction with the 'keystone,' which is not solid, and which supports the perpendicular plate, which is partly cartilaginous up to puberty, and the triangular cartilage of the septum is firmly held in bony surroundings for fully two-thirds of its circumference. To my mind, if simple pressure is applied in the right direction to the arched supports the natural law of force will produce deflection of the cartilaginous portion of the septum, provided that the perpendicular plate of bone cannot resist the force. This it cannot do if it is in an abnormal condition as the result of injury or disease."

Talbot has shown, after a wonderfully extended and thorough study of crania, that deviated septa, though frequently associated with high, narrow palatal vaults, are not invariably caused by this condition, but that all abnormal developmental processes are directly or indirectly the result of hereditary tendencies expressed in degeneracy or its opposite, atavism. Traumatic injury, a frequent cause, is not yet so common as to entitle it to the importance attributed by some writers, notably Bosworth.

As a matter of fact, prenatal conditions are beyond our corrective possibilities. We must therefore look to such causative factors as may in reason be controlled, and of these the most important is the lower jaw, as will readily be shown by the following examples: Fig. 3 shows the cast of the mouth of an individual in whose case it was impossible for the lower jaw to touch the upper except at certain points, after three years of age, and it will be noted that the diameter across at points where contact was possible is about normal, but anteriorly there has been almost no growth whatever, since

the arrest of development evidently resulted through a want of the chief enlarging factor, contact with the anterior portion of the inferior maxillary.

Granted, then, that asymmetrical development of the nasal bones, the turbinated bones and the nasal septum comes through the action or want of action of the lower jaw, wherein does the pathologic significance lie? Enlargement of the turbinated bones upon one or both sides serves to occlude the passages of the nares, breathing through the nose is interfered with, mouth-breathing in greater or less degree results, and want of oxygenation thus brought about

causes hypertrophy of the nasal mucous membrane. Then ensue hypertrophic rhinitis, the growth of spurs, and other pathologic changes tending to partial or complete stenosis of the nasal passages, which, even though removed by operative treatment, have a tendency to recur because of the predisposing conditions.

The indirect results of nasal catarrh are frequently severe impairment of general health, anemia, bronchial and lung affections, disease of the maxillary, frontal or ethmoidal sinuses, in fact, one of the most common causes of empyema of the antrum is mucous engorgment primarily induced by nasal catarrh. Headache, neuralgia, neuritis and catarrhal conditions of the intestinal tract by extension of the disease along the mucous membrane are also associated

affections. Arrest of development and general growth of children who suffer from adenoids, mouth-breathing and nasal catarrh is of common occurrence.

Dench says regarding inflammation of the mastoid process, "The most common cause of an acute inflammation in this region is an extension of a similar process from the middle ear." In reference to Eustachian catarrh he says, "This affection of the Eustachian tube usually arises from acute coryza, or an acute naso-pharyngitis."

The presence of adenoid vegetations is a particularly potent factor in its causation, since those masses easily become engorged with blood, causing hyperemia of the vaults of the tube, narrowing or completely closing the lumen. At the same time the presence of this soft tissue in the vault of the pharynx affords lodgment to pathogenic bacteria inhaled during inspiration, from which locality they easily find their way into the canal. Under prophylactic measures must be included attention to the mucous membrane lining the nasal passages and the pharyngeal space. Inquiry into the history of these cases shows the patients are subject to frequent "colds in the head or throat."

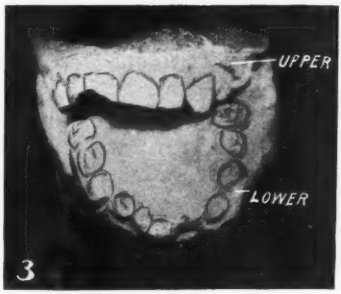
Removal of enlarged faucial and pharyngeal tonsils, reduction of hypertrophic processes within the nares, and actual removal of any obstructive deformity of the septum or of an extensive hypertrophy of the turbinated bodies are necessary.

Concerning chronic purulent otitis media Dench says—"This disease may follow either acute catarrhal or acute purulent inflammation of the tympanic cavity."

Bosworth says, "By far the most frequent cause of hypertrophic rhinitis, I believe, is deformity of the nasal septum, giving rise to stenosis, and occurring usually in the anterior portion of the passage. In every case the effect is a stenosis of the nasal cavity. The immediate result of stenosis is a gradually developing permanent hyperemia or distension of the blood vessels, which not only causes hypertrophic changes, but is followed by a certain amount of shrinking, as it were, in the tissues; not the atrophy which we meet with in atrophic rhinitis, but a bloodless condition of the vessels due to abolition of function. * * * The result of hyperemia, of course, is to increase nutrition, and we have as a consequence true hypertrophy taking place, a permanent structural thickening of the membrane. * * * Any deformity which causes a narrowing of the nos-

trils will cause the same symptoms. * * * Disease of the middle ear, as recognized by notable impairment of hearing, retraction, atrophy, or calcification of the membrane tympani, together with obstruction of the Eustachian tube, as determined by polarization, or the use of the catheter, is by far the most frequent morbid condition of the auditory apparatus met with in connection with intranasal disease. This affliction is undoubtedly a direct result of hypertrophic process in the nasal chambers."

In a certain proportion of cases of hypertrophic rhinitis tinnitus aurium is met with, usually in connection with middle ear disease, though in a smaller number of cases there is apparently no organic lesion. That this distressing disease may be dependent upon nasal



disease is shown by the fact that in a flattering number of cases it disappears under treatment. Hypertrophic rhinitis is also a prominent factor in the causation of attacks of hay fever and asthma. Headaches, eye trouble of various kinds, together with a large number of nervous diseases, such as chorea, epilepsy, etc., occur also in connection with intranasal disease. Diseases of the maxillary, frontal, ethmoidal and sphenoidal sinuses are each or all together a frequent result of hypertrophic rhinitis. The prognosis in these cases is often grave, necrosis and septic products making the ill effect often quite far-reaching.

"Affection of the sphenoidal sinuses," says Bosworth, "owing to their proximity to the optic foramina, may affect ocular vision or complete blindness may occur. Meningitis and death are always a possible result."

Disease of the larynx, affecting the vocal cords, thus influencing

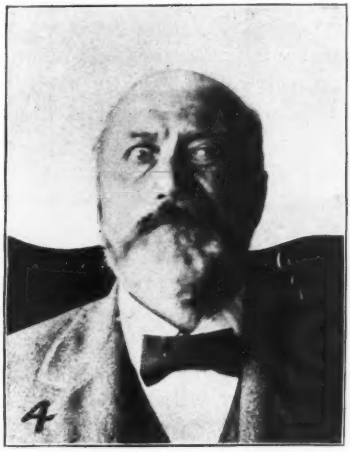
speech, vocal function, etc., and neuroses, such as paralysis, chorea, are by all authorities conceded to be largely influenced by the condition of the upper air passages.

Burrell says, "The arrangement of the nervous supply of the respiratory system in general is favorable to the production of reflex neuroses. The sphenopalatine ganglion supplies branches to the lining membrane of the nose, pharynx and Eustachian tube. It communicates with the facial and pneumogastric nerves, and unites in the closest connection the nose, pharynx, larynx, bronchi and ear."

It can be safely stated, and with due regard for all the existing causes that investigators have assigned for pyorrhea alveolaris, that by far the most common etiologic factor is some variation of occlusion. This statement is warranted by the fact that in every case of chronic disease of the pericementum there must exist one of three conditions—malocclusion, excessive occlusion or want of occlusion. It is obviously true that hyperemia of the pericemental vessels must, on account of the limited space and conical form of roots, cause more or less displacement of the relative positions of root, alveolus and occlusal surface.

If there be a preexisting irregularity or malocclusion the ill result is enhanced and the condition made worse. If the alignment of the tooth crowns be regular, and the occlusal surfaces are perfectly normal when in contact, then even a slight elevation of one or more must at once disarrange the mechanical harmony, with the result that the force of the muscular action of the lower jaw is brought directly upon the individual teeth that are affected. The slight yielding under this stress, a movement of the root in its alveolar socket, whether perpendicularly, or in a lateral direction when long and constantly continued, is favorable to a low grade of inflammation, and to absorption of the bony structures in the direction of applied pressure. The space thus produced, by destruction of surrounding and protecting tissues, allows the entrance of pathogenic bacteria, in the presence of which the tissue cells, having lost or at least suffered a marked reduction in their power of resistance, readily undergo degenerative changes, hence the pus pockets. Continued progress of the disease is marked by a thickening of the apical portion of the pericementum, a still greater elongation of the affected tooth, more extensive liquefaction of tissue and exaggeration of all symptoms.

Talbot in his pathologic researches has shown very conclusively the inflammatory changes which the pericemental, alveolar and gingival structures undergo in what he terms interstitial gingivitis. He first developed the fact that round cells of inflammation were to be noted far in advance of those grosser changes by which our microscopic observation was prone to place a limit upon the affected area. This must naturally be so, since traumatic irritation affects



the deeper portions of the pericemental surface, and through this makes possible more superficial symptoms.

The uric acid diathesis, or a gouty tendency, autointoxication, mineral poison, nervous affections, any interference with metabolic change, disturbance of the function of any organs of the body, and particularly, such as have the office of eliminating waste products, may each be predisposing, or even existing factors; as indeed, they may and do play such part in relation to any other disease, but in every case it is the mechanical activity of the lower jaw that makes possible the pathologic changes that take place.

It is only reasonable to suppose that, with the force of the jaws pressed tightly and continuously upon certain teeth, the moment such pressure is removed the immediate result would be a hyperemia of the pericemental and other vessels about the roots; frequent repe-

titions of this would bring about a chronic inflammation, evidenced sometimes by pyorrhea alveolaris, but very frequently this low degree of inflammation, through peripheral excitation, is undoubtedly responsible for many reflex nervous symptoms and often very serious ones.

These manifestations of the "jaw muscle habit" are comparatively easily recognized, but there are others less understood, though having a grave pathologic aspect when fully comprehended. The reason for this habit I have upon other occasions explained as follows: Whether central irritation be excited by some other primary disease, and the peripheral irritation thus be a secondary result, or the local disturbance an exciter of the cortical centers, the effect of the factor in disease is manifested by constant grinding or continued active pressure of the jaws, through unusual activity of the muscles of mastication, generally during moments of self-consciousness or sleep, but almost invariably without knowledge of the patient as to the extent or seriousness of the action. Besides the pericemental results of traumatic irritation, we have a more grave condition resulting where teeth are crowded in the arch. The bell-shaped or contoured natural crowns, when crowded together by pressure exerted in this way, are forced more or less out of line, and a tension of the nerves and vessels at the apical portion of the root in their passage through the alveolar socket results.

Thus we have nerve-stretching, which in my opinion accounts for many nervous manifestations and is a frequent cause of persistent neuralgia, or keeps the individual in a state of tension which is extremely wearing upon the vital forces.

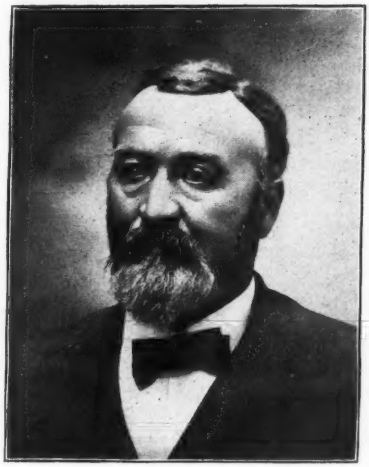
Premature puberty, sexual precocity, epilepsy, gout, insanity, rheumatism, obesity and other nutritive degeneracies, according to Kiernan, occur during what he terms the period of stress, centering around the conditions attendant upon and connected with the eruption of the first molar.

Brauer emphasizes the fact that convulsions in children require attention, to even the very small sources of irritation. In my own experience, very grave conditions have been relieved by adherence to this simple principle.

Another effect of the habit under consideration is the exhaustion which is in effect very similar to that of eye strain, an etiologic factor in disease that has received a general consideration not accorded this newer drain upon the vital forces, although its continu-

ance both night and day ought to make it much more effective than where the eye muscles can receive a measure of rest during the hours of darkness. As a matter of fact, neurasthenia is recognized by Weir Mitchell, Moyer, Brauer and many others as having the fatigue symptom for its chief diagnostic symptom. Rest is the recognized cure, and certainly with this unusual activity of the jaw muscles unchecked all methods of treatment must be more or less aborted.

There seems little reason to doubt the fact that correction of these two last forms of nerve disturbance would relieve many diseased



conditions that are, by ordinary methods of treatment, extremely difficult to overcome, and having once developed the fact that there is an association between functional nervous diseases of this character and the jaws and jaw muscles, the whole subject of the etiology and treatment of all of the neuroses and those perversions of nerve action from which neurotics suffer is at once open to us. And it must not be surprising to find that, in addition to chorea, epilepsy, and neuralgia, we may also have neurasthenia, hyperesthesia and anesthesia, as well as paralysis and other diseases, which, though more remote, may nevertheless result from exhaustive factors which impoverish and interfere with normal self-function of any kind.

The following cases are reported to give practical support to the theoretical structure that I have been trying to build for you. Fig. 4 shows the face of a man fifty-five years of age as it was during paroxysms of pain that appeared and disappeared at intervals of about two minutes, sometimes more frequently, though seldom less. There was hyperesthesia of certain areas of the pharynx that made attempts to swallow excruciatingly painful. History of the case showed a gradual increase in severity of symptoms for a period of five years. Only the left central incisor remained in the upper jaw on that side, all the rest having been extracted in the hope of giving relief, but without benefit. This left central was found to be elongated one to two millimeters, much abraded, and pushed forward from the grinding habit. Treatment was to grind down the elongated incisor and extirpate the pulp. An operation was performed upon the main nerve in that region to give immediate relief. Painful symptoms disappeared, and during two years' observation only twice was there a slight recurrence. Upon each occasion it was found that the afflicted incisor had again come into occlusion, and a few turns with a corundum wheel caused a return to normal condition.

Fig. 5 is the same as Fig. 4 after treatment. Exactly a similar experience might also be quoted with a woman about forty, unmarried, who suffered with a burning sensation upon the left side of the tongue, connected with a molar tooth and cured in the same manner.

Fig. 6 is a picture taken at ten years of age. When thirty the young woman, who had been for some time in a sanitarium, came to me in charge of an attendant on account of her almost irresponsible mental state. Hearing was practically nil in one ear and almost as bad in the other. Contracted upper arch, with extremely high vault and deviated nasal septum, was found to exist in such marked degree that there was almost complete stenosis of the nasal passage and the grinding habit was very marked. The widening of the arch made it possible to operate successfully upon the nasal septum and to catheterize the Eustachian tubes, which were done by the rhinologists who sent her to me. Correction of occlusion and support of the teeth with appliances gave much needed relief. The result was about fifty per cent improvement in hearing and good health, the latter evidenced by about fifteen to twenty pounds increase in weight.

This patient has since married, and it therefore seems unwise to publish her picture as she is at the present time, but a study of her childhood likeness should teach us much, since those defects which were to cause such great trouble afterward are already apparent. All such children should receive care which would anticipate and prevent future disease.

Fig. 7 shows the nose of a young lady, with arrest of development due to traumatism in childhood. Protrusion of superior teeth and

saddle-shaped arch were naturally associated with enforced mouth-breathing. Correction of the dental and palatal defects widened the nasal passages and made possible operation by Dr. Wurdemann, which completed the case with result shown in Fig. 8.

In Fig. 9 may be seen arrested nasal development due to mouth-breathing made compulsory by cleft palate and adenoid vegetations. Extreme difficulty was experienced in giving anesthetic. Closure of the palate by operation has not only given this boy of ten ability to acquire nearly or quite perfect speech, but we know also that the next few years will show a marked difference in the appearance and usefulness of his nose.

The results accomplished I refer for your consideration, with a full knowledge upon my part that psychic influences very largely affect all methods of treatment in the care of neurotics, and yet it is no more unreasonable for us as dentists to claim a full measure of importance for that which lies within our own field of action than it is for those who treat other special portions of the human organism.

Discussion. *Dr. R. H. Hofheinz,* Rochester, N. Y.: Dr. Brown stated that in all cases of pyorrhea malarticulation or malocclusion was present to a greater or less degree. I have pyorrhea in my own mouth, existing only upon the mesial root of a lower molar which I believe has perfect articulation. One of my patients, aged fifty-five, with the most perfect articulation that I have ever seen, has pyorrhea only on the left superior first bicuspid. Where malocclusion and pyorrhea are present in the same mouth, the question arises whether the former is the cause of the latter or vice versa. The case which Dr. Brown presented is particularly interesting to me because the patient was under my care for some time. None of those who saw the case diagnosed malocclusion as the cause of the pyorrhea but as the result, and I think that pyorrhea would certainly have existed even if the occlusion had been perfect. A careful examination of the models shows that almost perfect occlusion is present on the right side. Dr. Brown could not treat the pyorrheal condition of the first molar without destroying its pulp, and in that tooth at least he did not change the occlusion. I have seen the patient recently and will gladly acknowledge that the result of the treatment is very gratifying, but I differ with Dr. Brown as to the method of achieving it. True pyorrhea is invariably accompanied by a pathological peridental membrane, and the very fact that Dr. Brown changed the occlusion shows that he moved the teeth to a considerable extent and altered the condition of the membrane. I think an acute condition was produced which has changed to a cicatricial condition of the peridental membrane, such as we often find in replanted teeth. Four years ago I extracted, because of chronic abscess, a first bicuspid from the mouth of a woman fifty years old, and replanted the tooth with complete success up to the present time. At the date of extraction no pyorrhea was present in the mouth, but since that time it has developed on all the teeth with the exception of the replanted one. In this case we have either entirely destroyed the peridental membrane and there is no regrowth, or if there is a regrowth it must be of

a cicatricial nature. In many cases pyorrhea has been caused by malocclusion alone, but I cannot believe that the latter must always be present where the former exists.

Dr. M. L. Rhein, New York: The patient from whom this model was taken was sent to me for an opinion about a year ago, and I made a very careful examination at that time, so heartily agree with the view that Dr. Hofheinz takes of the case. The patient presented every evidence of malnutrition, which brought about an increase in

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the movement of the teeth in their sockets and a constantly greater amount of malocclusion. It is of course agreed that in the treatment of all forms of pyorrhea alveolaris the correction of any malocclusion is an essential feature of success, but I differ absolutely from Dr. Brown's statement that the immediate exciting cause of pyorrhea is invariably some form of malocclusion. The clinical history of many pyorrhea cases in advanced life, where there has been no previous malocclusion, and where the early occlusion was as nearly normal as possible, certainly refutes this assertion. The case under discussion showed a neurasthenic condition, and the general deterioration of the entire nervous system undoubtedly depreciated the nutri-

tional condition of the patient. Both Dr. Hofheinz and I earnestly impressed upon the patient the great assistance to be derived from hygiene, proper nourishment, etc., and the improved nutrition played a very important part in the marked improvement seen in Dr. Brown's case. I appreciate very much what he did, the difference of opinion between us is simply as to which was cause and which effect.

Dr. R. Ottolengui, New York: Under my care at the present time is a woman who had always enjoyed good health and who has brought five healthy children into the world. At the time of the menopause she became mentally deranged and was put in a sanitarium for nearly two years. She gradually recovered her mental health sufficiently to go home, but during the time a deafness which had been gradually coming on became very much aggravated. She has evidences of magnificent dental skill in her mouth, yet she comes to me frequently because her teeth "feel rough," as she describes it. I find every evidence that she grinds her teeth at night. I would ask Dr. Brown if part of her mental derangement and deafness is due to her habit of grinding the teeth, or whether the grinding is simply a concomitant pathological symptom of mental derangement, as the habit is common in insane asylums. Dr. Brown's success in a case of this kind leads me to hope that this patient may be helped in the same way, and I would ask him what line of treatment might be followed.

Dr. Brown: I will agree that an interference with nutrition will make the pericemental tissues less resistant so far as any pathological condition may be concerned, but when I plainly see some factor that is rapidly aiding in bringing about a diseased condition locally, even though there be more general disease, I know that improving the local condition will help the general condition. In such a case, when there ceases to be the turgid appearance of the gingival margins, indicative of a poor local circulation, and when infection from pus pockets and absorption of their toxic products are done away with, I know the general condition of the patient is going to be better. It is not my business to undertake the general treatment of the patient, yet my local assistance has made general treatment a practical, beneficial possibility, which would not be the case if the local trouble were unchecked. In the case under discussion I found the condition which I stated, and it was of comparatively little consequence whether it came

from some hereditary cause or something else—my first duty was a local duty.

As the casts have been passed about I have been rather amused at the attempts of some gentlemen to make an occlusion of those jaws. It cannot be done. When the patient came to me the glenoid fossæ seemed to be so enlarged, and the patient had such an uncertain jaw movement, that it was almost impossible to make her shut her jaws twice in exactly the same way, so she had to be trained to use them. I was at great pains to correct the occlusion, and extended the bands

beyond the crowns of the teeth to give artificial occlusal surfaces, so that the patient was obliged to bite straight up and down and the lateral motion was almost eliminated, and in the course of time the irregular habit was largely corrected. I believe that new tissue filled in the enlarged space in the glenoid cavities so that the patient did not have the room for unusual movement that she had before. Then the slight occlusal difference was gradually reduced until the teeth were finally gotten into as perfect occlusion as possible.

I am positive I can demonstrate that it must be practically impossible for the molar in the mouth of Dr. Hofheinz to have perfect

occlusion. You cannot have any tissue continually irritated by pain or otherwise without a change in its character. There will either be more tissue of some kind or a loss of tissue. It is not possible for the root, conical in form, to remain in the jaw exactly where it was before it was affected.

I repeat that it is impossible to have a case of pyorrhea without either malocclusion, excess of occlusion or lack of occlusion. In each of these three conditions we have an unhealthful, unnatural state which disturbs the pericementum and induces pathological change, laying it open to pyorrhea and possibly to other affections. I think a good many of the diseased conditions which we recognize, and many which we do not, are caused by changes, which we do not yet understand, taking place around the apical portion of roots, in the pericementum and in the pulp.

In regard to Dr. Ottolengui's patient, it is impossible to tell just what the result would be. In the treatment of these patients I endeavor to ascertain where the trouble lies, and then associate myself with a man whose specialty is the treatment of that particular disorder. The same is true with these nervous affections. The treatment should remove the strain from the system, and relieve whatever symptom is an aggravating condition. That is what we are trying to do by correcting these jaws and by using the rubber pad. This is a rubber plate, with hard rubber in the center, that goes over the crowns of the teeth so that the jarring or irritation may be removed. If you grind on one of your teeth, or put something between two or more of them, you will notice an intense desire to continue the pressure, and this is the case with a nervous patient. I am sure that grinding off with a wheel a little of Dr. Hofheinz's tooth will make him feel relieved almost immediately. This has been the result with every one of these patients.

Dr. Grant Molyneaux, Cincinnati: Will you please repeat your remarks about the glenoid fossæ?

Dr. Brown: This patient had such an extreme movement of the jaw that it was possible for her to bite forward as far as those teeth extend, as you see them in the cast, and to bite back again at least one tooth further back than normal articulation should allow. The lateral motion was very great, and it became apparent that the continuation of this habit had brought about absorption in the glenoid cavity under pressure, which is a natural result.

Dr. Molyneaux: Dr. Brown did not dissect the patient to find out whether there was any absorption in the glenoid cavity, and I do not believe that the absorption was produced unless there was some other process going on. I think the condyle was involved. Unless there is a suppurative process going on, no matter what happens to the condyle and below the condyle, in very few instances is the glenoid fossa affected to any extent. All the disturbance will be in the condyle, and the occlusion of the teeth does have an important bearing upon it, but not upon the glenoid fossæ. I have made dissections for twenty years myself and have seen many specimens.

Dr. Brown: To modify my statement, I refer to the temporo-maxillary articulation, which is the only essential thing. I have not dissected many people, so do not know whether or not Dr. Molyneaux's statement is correct, but if it is he should go on record to that effect, and I will be glad to accept the facts.

Dr. M. H. Cryer, Philadelphia: Three years ago before this Association I showed two specimens of skulls where the eminentia articularis had been resorbed and had left a perfect groove in the anterior wall of the glenoid fossæ.

BILATERAL BONY ANKYLOSIS OF THE TEMPORO-MAXILLARY ARTICULATION OF TRAUMATIC ORIGIN, AND ITS SURGICAL TREATMENT—REPORT AND PRESENTATION OF TWO CASES TREATED BY OPERATION.

BY W. J. ROE, M.D., PHILADELPHIA. READ BEFORE NATIONAL DENTAL ASSOCIATION, AT NIAGARA FALLS, JULY 28-31, 1902.

Bony ankylosis of the temporo-maxillary articulation of traumatic origin, not complicated by the results of infection, is probably comparatively rare, and I am strongly of the opinion that it invariably results from some variety of fracture involving the bones comprising the joint. It could therefore quite properly be considered among the sequelæ of fractures of these bones. The title of this paper therefore not only excludes many other etiological factors producing fixation of the mandible, but the other forms of ankylosis with their varied degrees. Had it not been for fear of making the paper too lengthy, I should gladly have considered several forms of extra-

articular ankylosis due to formation of cicatricial tissue resulting from numerous causes and their treatment, as I have had considerable experience in the treatment of the same.

In this report I hope to establish in each of the two cases to be presented the true etiology; to point out a very misleading symptom in reference to the true condition; to demonstrate a most valuable

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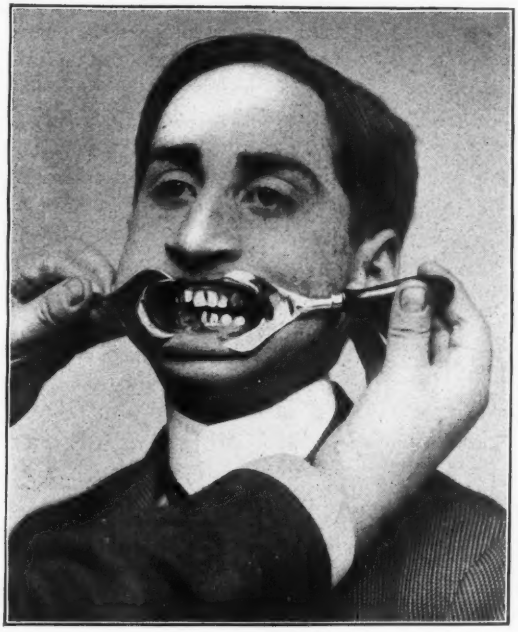
method for obtaining the true condition of the articulations, which shows whether both are involved and to what extent; the practicability of the treatment employed, the dangers to be anticipated and how to meet them.

I wiil now introduce my first patient, Mr. F. H. N., aged eighteen, whose history is as follows: When eight years of age he met with an accident while coasting. The sled which he and two others were

upon ran into a barbed-wire fence, and he was thrown violently against a post, striking his chin. He was unconscious for a short time, but regained consciousness while being conveyed home. He again became unconscious and remained so until the following morning, a period of about twelve hours. He had a wound about 1½ inches long beneath the chin, exposing the bone and evidently multiple fractures of the mandible. The lines of each as indicated



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by his parents were as follows—through the left angle, about symphysis or to the left of same, and through the middle of the right half of the body. From the history of the case and my examination I am persuaded that the location of the fractures as here given is incorrect. The wound was dressed and the mandible was bandaged for five weeks, at the end of which time the bandages were discontinued, when, in attempting to open the mouth, it was found

that ankylosis had taken place. During the following three weeks while attempts at motion were made he suffered pain in the region of the left ear, for which he consulted and received treatment from an ear specialist in Syracuse, N. Y.

About five years after this occurrence he came under the care of Dr. F., at Brooklyn, who gave him ether and forcibly opened his mouth by means of levers. This treatment was followed by the use of a screw gag three and four times daily for about three months, at the end of which time fixation was again practically complete. Two years later, Dr. G. of Utica repeated the same operation and aftertreatment, and subsequently on two occasions at intervals of two years and one year, with like results. An additional attempt was made under ether in the office of a dentist.

The patient was kindly referred to me in October last by Drs. Roy E. Jones and Joshua T. Pritchard of Remsen, N. Y. These photographs (Nos. 1 and 2), taken at that time, will show you the appearance which he presented. The noticeable features were marked recession of chin and considerable fullness in the region of each temporo-maxillary articulation. The facial measurements were as follows: From the hair line to gabella, 2½ inches; from the gabella to line of union between nose and upper lip, 2½ inches; from the latter line to point of chin, 2½ inches, and from the point of chin to line of harmony, 1⅜ inches. The mandible was firmly ankylosed, with the posterior teeth in occlusion and the anterior teeth separated some distance, as seen in the photograph. He was able voluntarily to separate the teeth in occlusion about 1-10 centimeter. Upon examining the muscles of mastication I found they were fairly well developed, evidently free from adhesions, and able to contract strongly, he having daily exercised their limited power. The size of the mandible led me to believe that development had practically ceased at the time of the injury, as it apparently was not larger than that of a boy of eight years of age. The rami formed almost right angles with the body and were decidedly more vertical than normal. There was no apparent deviation of the chin to either side, and no difference in motion, or upon examination, between either half of the mandible.

In order to ascertain whether there was any evidence of involvement of the tympanic membrane at the time of the injury or subsequently, I had his ears examined by Dr. Hoopes, otologist, who

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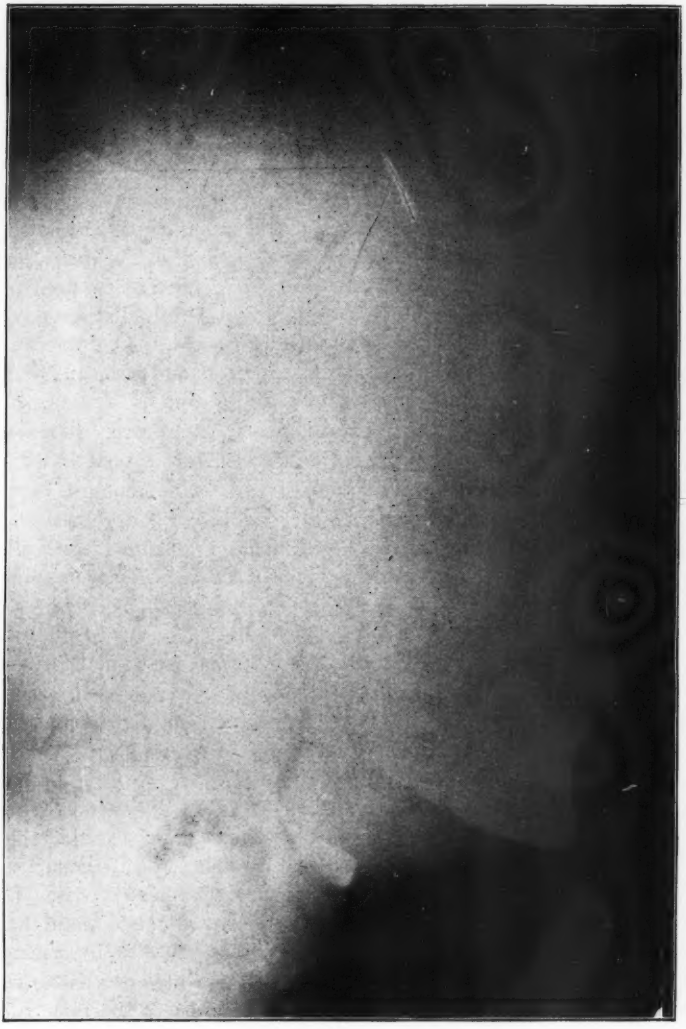
reported negatively, with present condition normal. Being still in doubt in regard to the exact position of the condyles, I was fortunate in securing these two very excellent skiagraphs (Nos. 3 and 4), which were taken by Dr. Charles Lester Leonard, who is a recognized expert in X-ray work. Each skiagraph shows the greatly enlarged condyle or mass of bone connecting the ramus with the temporal bone, about one-half of which is behind the posterior border of the ramus. This led me to believe that part of the original injury was a fracture through the neck of each condyle and union between the condyle and ramus at almost a right angle.

I decided to operate first upon the right side, and upon the left side about a week later, by the following method, which I will give in detail: On December 2, 1901, in the Jefferson Medical College Hospital, under ether anesthesia, I made an incision opposite the neck of condyle beginning just below the zygoma and extending downward 1¼ inches. The anterior border of the parotid gland was next retracted backward, exposing the masseter muscle. With a blunt-pointed dissector I separated the fascia and fibers of the masseter muscle and periosteum about opposite the middle of the skin incision, afterward dilating this opening with forceps until I could introduce my two index fingers. Through this opening I made a subperiosteal excision with a chisel of the mass of callus, including the condyle and neck, and found that the bridge of bone connected the outer surface of the head and neck of the condyloid process with the outer surface and lower border of the posterior portion of zygoma, and was about one-third of an inch in thickness and three-quarters of an inch in width. There was no union between the articular surfaces, and an apparent absence of the interarticular fibro-cartilage. After clearing the lower border of the zygoma and making smooth the excised border of the ramus, I was able to pass my index finger freely between the ramus and glenoid fossa, and could spring the mandible sufficiently to demonstrate that it was free upon that side, except for its muscular attachments. After carefully flushing with water to remove any chips of bone, I brought together the separated fibers of the masseter muscle and fascia with buried catgut sutures, afterwards closing the skin wound with Halstead's subcuticular suture, using silk-worm gut. (Gregg also recommends closing the wound without drainage.) The same procedure was repeated on December 9 upon the left side, and almost



NO. 4.

precisely the same condition of the articulation was found. As soon as the section through the neck of the condyle was complete, the mandible dropped a little distance. When I had completed the excision, and before closing the wound, I placed an ordinary mouth gag between the teeth and opened the mouth to about the normal extent, and then by grasping the mandible I made some lateral manipulations, after which the wound was closed.

There was no special interference with respiration during either operation and the patient made a rapid and uninterrupted recovery from each. The wounds healed by primary union, and in each case the sutures were removed on the eighth day. He was allowed to open his mouth as freely as the bandages would permit, and ten days after the second operation, when he left for his home, he could voluntarily separate the anterior teeth to the extent of one inch, and was learning to masticate solid food. Three weeks later he could open his mouth 1¼ inches. There was paralysis of the muscles supplied by the malar and infraorbital branches of the temporo-facial division of the seventh nerve, from which he gradually and almost completely recovered in two months. He has actively exercised the muscles connected with the mandible, and at the present time can open his mouth 1¼ inches, can close it with about as much force as the ordinary person, and has good lateral motion.

I will now introduce my second patient, Mr. E. W., aged eighteen, whose history is as follows: When five years of age he fell from a roof to the brick pavement, a distance of about fourteen feet, striking his mouth and chin. He bled profusely from his mouth and nose, and two of his upper front teeth were knocked out. Dr. Winter was called, and upon examining him found nothing wrong except injury to the teeth and gums, and after controlling the hemorrhage, ordered the application of ice bags to the sides of face. Considerable swelling took place in the region of the mandible, especially marked upon each side at site of the articulations. He was referred by Dr. Winter to Dr. Brown, dentist, who removed two other teeth that were very loose, and then fastened several lower teeth by wiring them. He was never able to open his mouth as wide after as before the fall, and a gradual decrease in the movements of the mandible was noticed, until at the end of nine months only very slight motion was possible. He applied for treatment at several hospitals in Philadelphia, and at one institution he received treatment three times each

week for a period of five months, as follows—his teeth were separated as far as possible by means of a screw gag, and then a wedge of soft wood was placed between them, after which the gag was removed, leaving the wedge of wood between the teeth for three days, provided he was able to bear the pain. It being necessary to use the gag in order to remove the wedge of wood, the patient in-

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variably returned in twenty-four hours, but occasionally endured the suffering for two days. When the wedge was removed the mandible could not be moved voluntarily, but would gradually close the space acquired between the teeth, and in doing so would give pain at the site of the articulations. The treatment was abandoned by the patient at the end of five months, owing to the suffering caused and the absence of relief.

He was kindly referred to me by his family physician, Dr. Heller,

about fifteen months previous to the time at which I operated. After studying his case carefully, and obtaining a skiagraph with the X-ray directed horizontally (which, however, was practically useless), I asked him to wait until I could decide more definitely in regard to his condition and the method of operation to be employed. These photographs (Nos. 5 and 6), taken at that time, will show you the appearance which he presented. The noticeable features were marked recession of the chin, but no fullness in the region of each articulation. The relative displacement of the point of the chin was ⅜ of an inch below and 1⅜ inches behind its proper position according to the line of harmony, the divisions of which measured as follows—from the hair line to gabella, 2¼ in.; from the gabella to line of union between the nose and upper lip, 2¼ in.; from the latter line to the point of chin, 2⅝ in., and from the point of chin to the line of harmony, 1⅜ in. The mandible was ankylosed, with the posterior teeth in occlusion and the anterior teeth separated the distance shown in the photograph. He was able voluntarily to separate the teeth in occlusion about 3-10 centimeter. The muscles of mastication were fairly well developed, evidently free from adhesions, and able to contract strongly, he having exercised their limited power daily. The development of the mandible had evidently ceased at the time of the injury, as it apparently was not larger than that of a boy five years of age. The rami formed almost right angles with the body and were decidedly more vertical than normal. There was no apparent deviation of the chin to either side and no difference in motion, or upon examination, in either half of the mandible. I was again fortunate in securing the two skiagraphs (Nos. 7 and 8), taken by Dr. Leonard. Each skiagraph showed practically the same condition as did those of the other case, and I therefore concluded that the original injuries and the results were similar.

Having decided to employ the method used in the previous case, I operated in the Pennsylvania College of Dental Surgery, February 13, 1902, upon the right side, and found a similar condition existing, except that the dimensions of the bridge of bone were somewhat less. The details of the operation were precisely as described in case number one. The operation was uneventful, and the only point of interest, especially, in connection with future developments, was the occurrence three times of embarrassed respiration, followed by slight cyanoses, which disappeared upon the temporary discon-

tinuance of the ether. This, however, did not cause any alarm or apprehension, as I had frequently seen the same condition more marked under ordinary circumstances. His convalescence was rapid and uninterrupted, and on February 20 I operated upon the left side,

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employing the same method, and found practically the same condition. In this as in the first operation, the ether was administered by Dr. W. R. Roe; some slight difficulty was experienced, as noted in the first operation, and special care was therefore exercised to administer the minimum quantity by which the operation was rendered possible, and the patient was barely under the influence of

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ether at any time. When I completed the section through the neck of condyle, and the mandible dropped slightly, more decidedly embarrassed respiration occurred and continued to some extent while I completed the work of removing the condyle and making smooth the zygoma and upper portion of the ramus. I now apprehended some trouble, and informed my class that the difficulty which we had experienced would be greatly increased when I attempted to open the mouth widely by means of the mouth-gag, which I was about to use. I also told them that Ranke's patient had perished from failure of respiration, and that another case had been saved only by immediate tracheotomy; also now that I had the mandible completely detached, and expected to open the mouth widely, gaining access to the tongue and pharynx, I felt confident we could control the situation by ordinary means if such difficulty occurred. In this I was sadly disappointed, as you will presently see.

When I placed the mouth-gag between his teeth and separated them respiration ceased. To restore it I made rhythmical traction of the tongue, while my assistants made artificial respiration by Sylvester's method, and in addition put the patient in Trendelenburg's posture. He was given hypodermically 1-10 gr. strychnia sulphate, and we also tried different positions of the head. These means failing, I attempted to reach the epiglottis with my index finger, but in this I failed, not having sufficient separation between the teeth. Having spent probably more than a minute in these unsuccessful attempts, and the patient's condition being one of complete relaxation, with extreme cyanosis, I did a rapid laryngotomy by plunging a scalpel through the cricothyroid membrane in a vertical direction, cutting down to the cricoid cartilage. Finding this space insufficient, I extended the incision upward between the two lateral halves of the thyroid cartilage, which gave ample room to open widely the larynx, and as artificial respiration was continued the cyanosis lessened and soon natural respiration was reëstablished. Fearing that infection of the wound upon the left side might have occurred during the attempts at restoration of the patient, and as there was some hemorrhage taking place, I packed the wound with gauze, and then closed it as in the other operations, except at the lower portion which the gauze occupied. As soon as the dressings were applied and the mandible was held in its original position with the bandage, the patient began to breathe partially through the mouth and nose. I

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had ready a tracheotomy tube to introduce if I found it necessary to keep the laryngotomy wound open. I closed the laryngotomy wound one hour after making, as he was breathing naturally, and there seemed no further use for the artificial opening. In closing it I placed three sutures in the skin, allowing the lateral cartilages and cricothyroid membrane to approximate, as they readily did, placing a gauze drain between the same and the skin, and coming out at the lower angle of the wound. He made an uninterrupted recovery without a single dose of medicine, and the only thing he complained of was some swelling of the tongue (the result of the application of the forceps) and insomnia. The gauze drain in the laryngotomy wound was removed in two days, the sutures in five days, and on the eighth day the wound was entirely healed. The packing was removed from the left articulation on the third day, the suture on the eighth, and the wound was entirely healed on the twelfth day, no infection having taken place.

In the first case, while the patient was under ether, I had the opportunity of opening the mouth widely by stretching the muscles and fascia connecting the mandible and was able to make it readily moveable. In the second case I had just begun a similar procedure, and had only opened the mouth about half-way when suspended respiration occurred. I afterwards regretted not having completed this procedure while the patient was breathing through the laryngotomy wound, as I could have done so then with safety. Fearing a repetition of interference with respiration if I gave him an anesthetic to complete the opening of the mouth, I began the use of the mouth-gag twelve days after the operation. This point was of extreme interest to me, for each method had its advantages and disadvantages. In the first case the overstretching of the muscles so long contracted would necessarily result in strain and laceration of some of their fibers, and thus result in weakening the muscles and the cicatricial contraction in healing would also lessen their ultimate functional power. In the second case, although believing that the slight stretching of the muscles was free from the dangers incident to the overstretching of the same, and promised better development, I feared I could not overcome the resistance of the fascia and secure a sufficient range of motion to the mandible. The mouth-gag was used at intervals of two and three days and then only with very moderate force, owing to the fact that slight pressure upon the teeth

would cause considerable pain, as the tissues of the alveoli had never been accustomed to resisting pressure, as in mastication.

Considering both cases carefully, I think the results are just as good in the second as in the first. Paralysis of the same group of muscles as occurred in the first case was present in the second, but it had entirely disappeared at the end of two months. The laryngotomy was followed by some functional disturbances, such as slight hoarseness and inability to speak loud, from both of which patient has entirely recovered.

The first thing I hope to establish in this report is the true etiology in each of the two cases, believing, as I do, that ankylosis resulted from fractures through the neck of the condyloid processes, for the following reasons: Fracture of the neck of the condyle is not as infrequent as is generally supposed. In forty-one cases of fracture of the mandible which we (Dr. W. R. Roe and myself) have treated, the line of fracture in six cases, two of which had multiple fractures, was through the neck of one condyle, and in one through the neck of both condyles. The displacement at site of fracture in each and all of these cases was forward and upward, bringing the fragments closer to or in contact with the lower border of the posterior portion of the zygoma. If the sharp ends of the fragments are in contact with the zygoma, they may have denuded the same of its periosteum at the time of the injury; or if the fragments are not in contact with the zygoma, but are nearer the same than if they were held in their proper relation to each other, and not completely immobilized, the irregular masses of callus which will form in the process of repair will frequently reach the lower border of the zygoma and mechanically denude the same of its periosteum. This I hope will explain the gradual and frequently slow occurrence of bony ankylosis in a number of reported cases. The skiagraphs in each case show clearly the angular displacement upward and forward of the neck of the condyle. This, in connection with the more vertical position of the posterior border of the rami, together with the separation of the anterior teeth, and the posterior teeth in occlusion, tallies accurately with the conditions which would result from such fractures. The delineation of the skiagraphs was verified at the time of operation, and the bridge of bone corresponded to this situation.

The very misleading symptom with reference to the true condition

to which I alluded was the ability to move the mandible 1-10 centimeter in the first case, and 3-10 in the second, which might have been taken by some to mean that with true bony ankylosis no motion, however slight, could occur. Cabot first called attention to this and said it was due to springing of the bone. In both of my cases it certainly was due to this cause. These skiagraphs demonstrate a most valuable method for obtaining the true condition of the articulation, and they also show whether both articulations are involved and to what extent. The negative is placed against the side of the head, and the tube is adjusted so that the rays pass through the articulation in an oblique upward direction, in this way avoiding the opposite ramus and angle, the shadow of which would not be as clearly defined as the ramus, which is in close contact with the negative.

As regards the practicability of the treatment employed, I still consider it preferable to operate only upon one side at a time, and first upon the side most involved. Both articulations could be operated upon consecutively during the same operation. The advantages of this would be that the operator could satisfy himself while the wounds were still open that sufficient bone had been removed to obtain freedom of movement; the necessity of the second etherization avoided, and possibly a lessened period of convalescence. Against this, however, is the increased danger from shock by prolonging the operation to just twice the length of time, as it is practically impossible to do synchronous operations; also the great danger of infecting the first wound, as it is very difficult to keep it protected from the fluids escaping from the mouth, with the head turned to that side while operating upon the opposite articulation. The wound in one week would be sufficiently healed to obviate the danger of infection.

The results in these cases depend largely upon the preservation of the function of the muscles of mastication, and I think it important not to cut through the masseter muscles by a horizontal incision below the zygoma, as many operators have done. The method which I have described to you of a vertical incision 1¼ inches through the skin only, and then splitting the fascia and fibers of the masseter muscles and periosteum, does not in my opinion weaken the muscles to any appreciable extent. If the incision is limited to the skin, it is not possible to injure Stenson's duct or the temporo-facial branches of the facial nerve. I believe the temporary paralysis in

each case was the result of overstretching the nerves. By means of special retractors this method gives sufficient room for thorough and careful work. The function of the external pterygoid is necessarily lost. Considerable lateral motion has been observed in many cases of unilateral ankylosis operated upon, due to the action of the opposite external pterygoid; but in bilateral cases lateral motion is probably entirely lost.

I greatly prefer closing the wounds without drainage, as the facial contour is better preserved, especially if the muscles and fascia are held together by buried sutures. There is always considerable danger of the wound becoming infected subsequently when drainage is employed, and it is of the greatest importance to prevent infection, not only on account of the immediate danger of the same, but from the ultimate formation of a much greater quantity of cicatricial tissue, which would greatly limit the functional results; also a depression inevitably results when drainage is employed. Some have packed the articulation with gauze for the purpose of keeping the surfaces of the bone more widely separated. When the wound is closed the empty space will become distended with blood clot, which will to some extent serve the same purpose, and if a wider separation of the false joints is desired, I would rather employ the method suggested by Cabot, of placing wedges of cork between the posterior teeth to maintain separation. Although I did not employ this method, I believe it has special advantages and should be used when practicable.

The most important question of all is the consideration of the dangers to be anticipated and how to meet them. I quite agree with Ranke, who said the greatest danger is from asphyxia, and I heartily sympathize with any operator who is confronted with this difficulty. In studying these two cases I have endeavored to explain the occurrence of this condition in so serious a form in one and to no appreciable extent in the other. The ages of the patients were practically the same, they were both in fair general physical condition, and the same care and technique were employed with each. I will give you the following reasons for believing that this occurrence is dependent upon mechanical conditions, and hope that they may be of some help in anticipating its occurrence in the future. The normal position and function of the larynx is dependent upon the muscles which suspend it, the anterior group of which are connected with the

mandible. I consider it reasonable to infer that the earlier in adolescence development of the mandible ceases, the more abnormal will be the position of the tongue and larynx. In consequence of the mandible maintaining a fixed position in relation to the head while ankylosed, the muscles connecting the hyoid bone, the tongue and epiglottis with the mandible are accustomed to perform their functions with a limited power of contractibility. If the mandible is dropped to a very slight extent you can readily see how the functions of these muscles would be greatly disturbed. The relative difference in my two patients is quite marked and easily demonstrated. The first was eight years of age when the injury occurred, and the second five, and although the subsequent development of the mandible practically ceased, the three years difference in the ages of the patients at the time of the injury has made a marked difference in the conditions of each. In the skiagraphs of the first patient the position of the head in relation to the cervical vertebra is about normal, the lower border of the mandible making an angle with the bodies of the vertebra five degrees less than a right angle, and the hyoid bone is shown one centimeter below the border of the mandible. The skiagraphs in the second case show considerable extension of the head upon the cervical vertebra, an angle of five degrees greater than a right angle, and the hyoid bone is seen three centimeters below the lower border of the mandible. The position of the hyoid bone is two centimeters lower in its relation to the mandible in the second case than in the first. The displacement of the larynx, hyoid bone and base of tongue can be approximately estimated by the following measurements: There are 1½ inches of trachea above the manubrium, which can be increased on extension to 1¾ inches; in an adult there should be an average of 2¾ inches; at ten years of age there should be 2¼, and at six about two inches. The cricoid cartilage is opposite the body of the seventh cervical vertebra instead of the sixth. Therefore it is a reasonable calculation, that the position of the base of the tongue, hyoid bone and larynx is one inch lower than it normally should be, and their position remains practically the same in their relation to the manubrium as it was when the injury occurred at five years of age. I believe there are two factors, both dependent upon the arrested development of the mandible, to which the faulty position of these organs is due. The position of the larynx and base of tongue is dependent upon the posi-

tion of the hyoid bone, it being suspended from the base of the skull by a duplicate set of muscles, namely, the stylohyoid, the posterior belly of the digastric, and the middle constrictor of the pharynx; and from the mandible by the geniohyoid, the mylohyoid and a portion of the geniohyoglossus, and the anterior belly of the digastric. We will recall the fact that the position of the chin is 1⅜ inches posterior to the position it normally should occupy, therefore I believe that if the chin could be carried forward to its normal position the anterior group of muscles acting from that point would raise the hyoid bone at least one inch, which would be its normal position. And of still greater importance is this, that it would not only raise the hyoid bone, but would carry it forward, and with it the base of the tongue and larynx would be carried away from the posterior pharyngeal wall. The importance of this as regards the function of these organs you will readily appreciate. I have gone into these details in order to explain to you, in the present condition of the patient, that the hyoid bone, with the organs dependent upon it for their position, are not only displaced downward to the extent already given, but they are displaced backward, leaving practically very little pharyngeal space, and when the mandible is lowered to a very slight extent the base of the tongue and the posterior surface of the larynx lie in apposition to the posterior pharyngeal wall, and while in this position respiration is very difficult. I have frequently demonstrated this fact by retaining the mandible in a depressed position by means of the mouth-gag, when the patient would become partly cyanosed and make violent efforts at respiration. At first I was inclined to believe that the obstruction to respiration was due to closure of the glottis by the epiglottis, the control of which having been lost by the changed position of the hyoid bone, as the movements of the epiglottis are practically dependent upon the position of the same. It would be folly on my part to attempt to exclude this as a factor, but I am strongly of the belief that the obstruction to respiration is due to the crowding of the larynx and base of tongue against the posterior pharyngeal wall, leaving no space for air to reach the glottis, and as a natural consequence the epiglottis would be forced against the glottis. In favor of these ideas are the following observations made at the time of operation—the respiration did not become impeded until the mandible was completely detached, and as a consequence dropped one-quarter of an inch, and it was not

entirely impeded until I depressed the mandible about one-half inch by means of the mouth-gag; traction upon the tongue with the mandible depressed was of no avail, neither could it be while the base of the tongue was crowded against the pharyngeal wall.

How are we to anticipate the danger of asphyxia in any special case before operation? The first practical point would be the age at which ankylosis occurred and development of the mandible ceased. But that in itself would have little significance if the operation were done soon after the above occurrence, as the displacement of the hyoid bone, base of tongue and larynx evidently increases with growth, reaching its maximum at adult life. Consequently, I consider the danger of asphyxia would increase in proportion to the time intervening between the occurrence of the ankylosis with arrested development and maturity. Further, I believe that ankylosis occurring after maturity would not cause any displacement or abnormality of the organs of the larynx, hyoid bone and tongue, and consequently there would be no more danger of asphyxia than ordinarily.

Upon this important point I consulted by letter the recognized authority, Dr. Thomas Dwight, Professor of Anatomy, Harvard Medical School, whose recent very valuable contribution upon the "Growth of the Face and Especially the Pharynx" bears directly upon this subject. I quote the following from his reply: "I am quite of your opinion that the very serious danger in your case was caused by the tongue (carrying the epiglottis with it) falling back and obliterating the pharyngeal space. I think it is not generally recognized how very small that space is under any circumstances, as is well shown on frozen sections in the median line. Very probably in your patient the space was even smaller than usual. I cannot, however, agree with you concerning one point. You suggest that the want of development of the mandible was the cause why the hyoid was not carried up to its normal position. The fact is, that in the infant the hyoid and larynx are very high and gradually descend, and for that matter the lower jaw descends too, for at birth its lower border is nearly in the same horizontal plane as the occiput. Consequently its function is not to pull the hyoid up. The uncommonly low position of the hyoid is a puzzle. So far as I know it must be extremely rare. Can it be that the want of development of

the jaw in some way failed to restrain its descent? I own I do not see how this should occur. I am sorry that this is all I can say."

I would answer the above question in the affirmative, believing that it is the proper solution. As already described, the bringing closer together of the occipital and mandibular attachments of the muscles, which suspend the hyoid bone allows the muscles to assume an almost vertical instead of an almost horizontal position. Again, the growth of the tongue would necessarily displace the hyoid bone downward, owing to the fact that it could not extend anteriorly on account of the teeth in the ankylosed and undeveloped mandible, the external measurements of which are as follows—between angles, 9½ centimeters; between angle and symphysis, 7 1-10 centimeters; between angle and zygoma, 4½ centimeters. Therefore not only the antero-posterior measurement, but the lateral measurement, was lessened, which, with the inward displacement of the teeth, would greatly restrict the space normally occupied by the tongue. My attention was called to this lateral narrowing of the pharyngeal cavity by Professor E. Braden Kyle, who made an examination of the pharyngeal space and coincided with my views as regards the cause of asphyxia.

Having considered the age of the patient and its significance, a carefully elicited clinical history will aid materially in anticipating the danger of asphyxia. In case number two ordinary respiration was attended by considerable stertor, and during the entire period in which the mandible was ankylosed he was never known to sleep without snoring loudly. To secure sleep he would generally assume the prone position, with the head turned to one side and extended over a pillow, or, if in a supine position, he would place one or two pillows beneath his shoulders, thus placing the head in full extension. In each of these positions he accomplished what Dr. Howard of London claimed, that "the best way to raise the epiglottis is not by pulling the tongue forward but by extending the head and neck."

The necessity for full extension of the head during these years explains the acquired faulty position of the same with the vertebra, as shown in the skiagraph, and as already described, together with a marked prominence or anterior projection of the bodies of the second and third cervical vertebra, against which the soft palate is closely drawn.

Having considered at some length the dangers to be anticipated, the question of how to meet the same is of the greatest importance. Where the danger of asphyxia is threatened and imminent the practical necessity of the use of the mouth-gag during the anesthesia is, in my opinion, not sustained by the results in these two cases, as the result in the second case is quite satisfactory and equally as good as in the first case, and demonstrates the practicability of obtaining sufficient stretching of the muscles and fascia subsequent to the operation. In any case where more active use of the mouth-gag is required I would recommend the use of metal shields to cover the teeth, permitting greater force to be applied, as originally recommended by Dr. Goodwillie of New York.

To relieve asphyxia when present, instead of attempting to further depress the mandible, to make traction upon the tongue, or reach the epiglottis as I did in my case, I would restore the mandible to its ankylosed position, believing that by doing so it would place the organs in the best possible condition to facilitate respiration. In addition, if necessary, I would hook a tenaculum under the hyoid bone and lift it away from the posterior pharyngeal wall. This means failing, I would then do a quick laryngotomy. The low position of the hyoid bone, and the correspondingly small amount of trachea above the manubrium, would have rendered in my case a tracheotomy both difficult and dangerous, and hardly practicable in such an emergency. It is scarcely necessary to state that in conjunction with different means employed, artificial respiration should be continued, and other aids as indicated.

The clinical history of case number two would be incomplete without giving briefly the condition of the mouth, nose and throat when, subsequent to the operation, examination of the same was made. Besides several cavities in the remaining teeth, the four first molars were so badly decayed that practically only the roots remained, and these were extracted about three weeks after the operation. The second lower molars were opposite to the anterior angle, and were in a horizontal position, the crowns looking inward and towards each other. These teeth were so far within the arch that I had not been able to determine the presence of them until after the mouth was opened. For the care of his nose and throat he consulted Dr. Walter J. Freeman, who very kindly sent me the following report of the condition which he found: "After your operation * * *

I found his difficulty in breathing due to adenoids and relaxation of the soft palate. The velum lay on the back of the tongue, and the uvula was so broad that the faucial opening was almost completely shut off from the throat. View of the vault could not be obtained through the throat, but the obstructing mass of pharyngeal tonsil could be plainly recognized through the nasal fossæ. I amputated the uvula, and the noisy respiration was immediately improved. With a snare I then removed a mass of the adenoids through the nose, and operations on this were continued by my associate, Dr. Baldwin, until the vault was completely cleared. Since that time I have not seen the patient, but trust the improvement I then saw has continued."

As regards the cause of the arrested development of the ankylosed mandible, I am unable to offer any explanation, but take pleasure in referring to the opinion of Dr. M. H. Cryer, expressed in his "Studies of the Internal Anatomy of the Face," and to the interesting illustrations therein, which correspond in detail to these skiagraphs and show very accurately the typical-shaped ankylosed mandible.

What prophylactic measures can be used to prevent possible ankylosis in cases of severe injury to the mandible, similar to the two cases here reported? A careful examination of the mandible in the regions of the articulations will frequently disclose a fracture which, when present, should invariably be treated with an interdental splint with a closed bite, or the application of Dr. Angle's system of treating fractures with the teeth in occlusion. By doing so the fragments will be maintained in their proper relation to each other and be carried away from the zygoma, practically obviating the danger of ankylosis. In my seven cases so treated there was no appreciable interference with the movement of the mandible.

Having reviewed and abstracted the literature upon all forms of ankylosis of the mandible, I find it too exhaustive to include in this paper, and will but briefly allude to a few questions of special importance. Of all the operations and methods resorted to in the past for permanent ankylosis of the mandible only two are now being generally employed. Excision of the head and neck of the condyle was first performed by Professor Humphry of Cambridge in 1856, for the relief of ankylosis due to chronic rheumatic arthritis. The other operation is known as Esmarch's, who suggested it at the Congress of Gottingen in 1855, and it was first successfully per-

formed by Dr. Wilms in 1858. It consists in establishing a false joint in front of existing cicatricial tissue.

I cannot agree with David M. Gregg (*Practitioner,* December, 1899), who says, "The only operation worth considering is excision of the neck and condyle;" nor can I agree with the conclusion of Dr. Paul Swain (*Lancet,* July 28, 1894), "Taking, therefore, into consideration the simplicity of the operation as compared with excision of the condyle, and the superiority of the results, I think it may fairly be suggested that the modification of Esmarch's operation is the one which surgeons in the future should prefer." I do, however, practically agree with the opinion expressed by Dr. A. C. Cabot (*Lancet,* August 7, 1897), "In cicatricial contraction due to noma, burns or lupoid inflammation, the section of the bone must be in front of the cicatrix, forming a false joint in front of the detaining bands, Esmarch's operation producing the best mechanical condition possible. In bony ankylosis the nearer the section is made to the joint the nearer do the conditions simulate the normal."

The condition of the articulation and the surrounding tissue is, in my opinion, the proper guide in deciding which operation to employ. In the absence of cicatricial tissue, as in my two cases, or when present in such quantities that there is a reasonable assurance that it can be overcome by appropriate treatment, I believe in excision of the head and neck of condyle. Where the muscles are destroyed, or their function is held in abeyance by dense cicatricial tissue which cannot be overcome, I believe that Esmarch's operation is clearly indicated and offers the best results. The preservation of the maximum amount of musclar function in bilateral cases is of the greatest importance. In unilateral cases it is quite possible to have good masticating power from the muscles of the uninvolved side, even if Esmarch's operation is done upon the opposite side and in front of the masseter and internal pterygoid. But when Esmarch's operation is done in bilateral ankylosis the power of mastication is very feeble or lost, and in one case reported the central portion of the mandible was so beyond the control of the elevator muscles that for two days after the operation it caused grave danger of asphyxia by its depressed condition.

Of considerable concern to me was the question whether new bone would form from the periosteum after excision of the head and neck of condyle, which would subsequently lessen the range of motion.

The results in these two cases and in others reported demonstrate that this danger is scarcely to be apprehended, and that it is quite expedient to make a subperiosteal excision.

Discussion. *Dr. C. N. Peirce,* Philadelphia: How did these young men feed themselves?

Dr. Roe: In both cases they placed their food between the lips with a fork, and then with the index fingers forced the food through between the teeth, especially in front where the latter were not in occlusion. It usually took the second patient about an hour and a half for a meal.

Dr. M. H. Cryer, Philadelphia: I heartily approve Dr. Roe's operations, and do not see what else could have been done than removal of the condyloid process as near as possible to the original fracture or injury. If there should be any interference here, either by the masseter or by the internal pterygoid, then it would be preferable to make a short and false joint anterior to those fibrous attachments. In removing the head of the condyle we get below the insertion of the external pterygoid, and that is why in both Dr. Roe's patients, in one in particular, a certain amount of lateral movement was lost. Of course, we understand that it is the external pterygoid which gives the greatest amount of movement to the jaw laterally, rocking it from one side to the other, as in the ruminant animals when chewing cud. There is a possibility of some of the fibers becoming attached to the mandible below the point of excision. We might in this way have motion from the external pterygoid. I believe it was stated that the second patient had had no lateral motion. It is possible to secure lateral motion from even the masseter, as it has two heads, or rather, the muscular fibers run in two directions. If the first patient will practice moving his jaws from one side to the other I believe the masseter muscle will eventually give him considerable lateral motion.

I differ with nearly all teachers in regard to the function of the epiglottis, as I do not think that it ever closes over the glottis either in pathological or physiological conditions. In my opinion it has nothing to do with the glottis, but is there as a separate organ. In experimenting with various animals I have cut away the ramus of the jaw to facilitate observation, and have then tried to tease the epiglottis over the glottis, but have never succeeded in so doing. If I passed water from a syringe over the glottis it would close inde-

pendently. The folds would close over, but the epiglottis never showed an attempt to close over and protect the glottis. I removed the epiglottis from quite a number of cats and dogs, and allowed the animals to get well, and the function of the glottis was never affected. Therefore I do not think that in the falling back of the tongue the epiglottis ever causes asphyxia. In Dr. Roe's second patient the asphyxia was due to the falling back of the hyoid bone, along with the base of the tongue, which then came in contact with the posterior wall of the pharynx. I have numerous slides which will uphold Dr. Roe's statement that this space is very narrow. The tongue naturally fills the mouth and a great portion of the pharynx. We see this space when the mouth is opened, but when it is closed the tongue occupies the space from the teeth back to the posterior pharyngeal wall or nearly so. The roof of the mouth really includes the soft palate and the uvula, and the latter comes into close relation to the posterior wall of the pharynx. The slides which I will show tomorrow evening will demonstrate this point very well.

Dr. G. V. I. Brown, Milwaukee: I have here a flexible dummy, by which I hope to show why it is that through any affection of the lower jaw we have malformations of the associated parts. With my paper and illustrations I hope to make it clear why the hyoid bone was lower, and why the other parts were in such condition that threatened asphyxia was one of the great difficulties of the operation.

Dr. J. D. Patterson, Kansas City: There is a very practical lesson in Dr. Roe's paper, namely, that in all cases of fracture there is danger of injury at the condyloid or coronoid processes, and when in reducing the fracture we hold the jaws immovable with a fixed splint, after it has been worn a short time we should take it off and give movement to the jaws, doing this two or three times during the healing, in order to forestall the possibility of ankylosis.

Dr. T. W. Brophy, Chicago: About a year ago Dr. DeSund of Vienna advocated the use of paraffin in many places, especially where we wish to preserve the contour and rotundity of the parts and to take the place of lost sections of bone. Dr. Beck of Chicago has recently employed paraffin in such cases, and for the purpose of lifting up and overcoming the depressions following operations and the removal of cicatricial tissue. Dr. Roe speaks of the blood clots serving a good purpose in his cases, but I think paraffin could be used

to better advantage, and there would be no filling in of material which would produce bone.

Dr. M. L. Rhein, New York: At the present time in the first case the only occlusion is with the very back teeth, and after the magnificent technique displayed by Dr. Roe in getting rid of the ankylosis, and the excellent result of his work, it does seem that some steps should be taken to obtain a better general occlusion.

The patient has been examined by us all, and while lateral motion is undoubtedly present, it seems to me, after a careful examination, that it is produced entirely by an acquired use of the masseter muscle and not from the pterygoid muscle at all. Dr. Cryer has examined the patient since he spoke and I would ask his opinion.

Dr. M. I. Schamberg, Philadelphia: Dr. Roe does not endeavor to explain why the hyoid bone falls when the normal articulation is reestablished. I judge it to be due to the pulling of the sternothyroid and omohyoid muscles when the jaw is released by operation, for it is a well known fact that these, together with the other auxiliary muscles of mastication, are unusually well developed in ankylosis. Dr. Cryer recently published photographs of a patient suffering from ankylosis in which the auxiliary muscles of mastication were shown to be in a state of contraction during an effort to open the mouth. I believe that if a ligature were passed through the floor of the mouth directly in the median line, and immediately in back of and closely hugging the mandible, the dropping of the hyoid bone against the posterior wall of the pharynx would be averted. This method would be similar to the one in which a ligature is passed through the tongue to prevent its being swallowed during operations about the mouth. Anterior traction applied to the jaw by means of the ligature passed around it would pull the hyoid bone forward through the medium of the geniohyoid and the geniohyoglossus muscles, thus obviating the possible necessity for a tracheotomy.

Dr. J. Y. Crawford, Nashville: Dr. Cryer's reference to the normal mouth in a closed condition not being a cavity, but being filled up with tongue, teeth, mucous membrane, etc., is a valuable suggestion.

The region involved in the production of this ankylosis is not such a dangerous territory as supposed, for nature helps along mightily. Sixteen months ago I had charge of a pathological fracture of the lower jaw which resulted in the loss of the body to the point of the

first molar, back to the angle, from the angle to the ramus, to the condyle, and its complete removal. I had to fracture it at three different points, and I never found the coronoid process. Nevertheless, it is almost impossible at the present time to observe any deficiency on that side of the face, and the patient seemingly has quite as much strength on that side as on the other.

Dr. J. Taft, Ann Arbor: The statement is frequently made that the general surgeon knows nothing of oral surgery, but there is so much in medical and surgical practice of which the dentist knows little or nothing that it behooves him not to boast or make invidious comparisons. There is a just appreciation in the surgical world of what the dental profession does in these cases of oral surgery, and we cannot afford to be less generous or just. It is for the interest of all concerned that the most harmonious relations should exist between the physician, general surgeon and dentist.

Dr. S. W. Foster, Nashville: For the past four weeks I have had a case covering the point which Dr. Patterson brings up. The patient fell from a moving train eleven weeks ago and suffered a compound fracture of the inferior maxilla just above the lower border of the ramus, also near the symphysis, and posterior to the first bicuspid, with dislocation of the left zygoma. He was treated for seven weeks without securing union of the anterior fracture, but the dislocation was reduced. Four weeks ago he came into my hands. A skiagraph disclosed a union of the jaw at the ramus, showing that in articulating the parts the jaw was slipped backwards. On investigation I found that there was an anterior occlusion before the fracture occurred, so as far as approximation was concerned the teeth were in better shape after the injury than before, with the exception that in getting this union with the slipping back of the jaw there was an occlusion of the third molars only. The incisors lacked at least three-eighths of an inch of being in contact. Ankylosis was developing rapidly, the patient not being able to open his mouth more than half an inch. Under the circumstances the question was, how we should approximate the fracture near the symphysis and also prevent complete ankylosis. Believing, as Dr. Patterson suggested, that bringing the jaws in contact with a fixed splint would produce ankylosis about as soon as a union, I decided to use bands and bars, which I consider the only rational method. We approximated the broken parts and placed them in such a position that they could not move,

but at the same time did not bandage the jaws, leaving them perfect movement. Owing to the shortening of these muscles the lack of occlusion had to be overcome. By the use of the ordinary cap and chin rest with strong elastic pressure we produced an appliance which the patient wore at night, but we gave him free use of his jaw during the day. At the present time there is apparently perfect union of the fracture, the teeth having been brought into almost normal occlusion, and the ankylosis has been virtually overcome.

Dr. Cryer: After examining this patient I would say in reply to Dr. Rhein that the most of the lateral motion of the jaw is produced by the masseter muscle. I believe I can feel a contraction first of its anterior and then of its posterior portion. Of course there are other muscles assisting—even the superior and middle constrictor muscles of the pharynx have fibers connected with the pterygomandibular ligament, and all the muscles associated with the mandible would have a slight effect.

Dr. Roe, closing discussion: I consider Dr. Patterson's suggestion of great importance. In general surgery passive motion is made at intervals after ten to fourteen days to prevent the possible ankylosis from the union of the callus between the two articulating surfaces. The point to which Dr. Rhein refers is of great importance. The occlusion in both cases is through the posterior teeth, the anterior being separated. The occlusion now is just as it was before the operation. I feared that when I removed the head and neck of the bone, the temporal, internal pterygoid and masseter muscles would draw up the ramus, and tip the point of the chin further down, interfering with the occlusion of the anterior teeth, and cause an additional deformity and lack of function. I am happy to say that this has not occurred, and in both cases the anterior teeth are as near occluding as they were previous to the operation. With reference to improving the occlusion, I do not see any plan which would be efficient except sectioning the mandible about the angle, or a little in front of the angle and back of the teeth, placing the teeth in the corrected occlusion and securing union in that position. This I did in a case last winter where the occlusion of the anterior teeth was extremely faulty, due to the displacement of the fragments following a multiple fracture. The case presented three fractures and had been treated with an open-bite splint. Union had occurred where the fragments were separated, and the result was a faulty occlusion

of half an inch. I sectioned the bone in three places, in one taking out half an inch, in the second a quarter of an inch, and in the third simply sectioning it. The occlusion was corrected and maintained while the case was treated with a closed-bite splint, leading to a very satisfactory result.

CONGENITAL CLEFTS OF THE PALATE IN INFANTS (STEREOPTICON EXHIBIT).

BY T. W. BROPHY, D.D.S., CHICAGO. READ BEFORE NATIONAL DENTAL ASSOCIATION, AT NIAGARA FALLS, JULY 28-31, 1902.

It is not my purpose to review the literature of surgery of the palate, but to point out to you by means of the anatomical pictures which I shall project upon the screen abnormal relations of the superior maxillary bones, with special reference to the nasal passages, which almost invariably are observed in patients having congenital cleft palate.

I was fortunate enough to procure, through the kindness of Dr. J. S. Stone of Boston, some slides which were made from photographs of cut sections of two infantile cadavers in which the deformity of double hare-lip and cleft palate existed. Dr. Stone made use of these pictures in an article published in the *Boston Medical Journal* to show that the method I have devised in transfixing the bones and immediately approximating the cleft is objectionable. They enable me, however, to present in a better, more satisfactory and convincing way than I have ever before been able to do, the efficacy, expediency and the unquestionable merit of the methods I have devised and which I practice.

These pictures are made from sections from an infantile cadaver. The tissues were frozen, then vertical sections were carefully made through all of the facial bones, so that they are anatomically correct. The first one shows the integument and facial expression, in which the deformity is very conspicuous. Section after section has been made from before backward. The picture now upon the screen is from the collection obtained from Dr. Stone. You will observe that it presents a good likeness of a child which has bilateral hare-lip and congenital cleft palate.

The next picture is made from a vertical section of the tissues immediately back of the preceding picture. You will be impressed

with the fact that as here exhibited the upper jaw is very much broader than the lower. You will see that the lower jaw or alveolar border comes in contact with the inclined plane of the hard palate, meeting it inside of the alveolar border, and pressure thus made by the lower jaw against the upper is continually wedging the separated portions of the upper jaw further and further apart. You will also observe that there is an abundance of tissue to form a good hard palate if the bones of the upper jaw are pressed together so that the edges of the cleft will be brought in contact. The upper jaw would then be of the same width as the lower.

It is a rule that in congenital cleft palate there is not a deficiency of tissue in the median line, but that there has been failure of union and the bones have been crowded apart by action of the lower jaw in embryo, and I believe that the widening of the fissure begins at the time when the muscles of mastication first become active. This may be demonstrated to the satisfaction of anyone who will examine a cleft-palate child, and bring the lower jaw in contact with the upper, when it will be seen to immediately force apart the hemispheres of the upper jaw.

There are cases of insufficient palatal tissue to enable the operator to produce a good palate, but they are extremely rare.

The third section which I present is especially impressive by reason of the fact that the nasal opening is shown to be unusually broad, as is always the case in clefts of this character. You will see that the lateral walls of the nares form an inverted V or a triangle, the base of which would be upon the palatal plates of the maxillary bones.

Does it not seem self-evident that when the palatal plates of the bones are brought in contact, the walls of the nares brought more nearly to their normal condition, and firmly held there by properly adjusted silver sutures, the deformity may be thus overcome and the parts restored to a nearly normal condition?

It has been said by some practitioners that the forcing of the jaws together in this manner would cause a deformity by contracting the upper jaw; furthermore, that it would result in nasal stenosis. These statements have been based on theory without a knowledge of the facts, but in the light of a clinical experience and proof thereby established nasal stenosis has never been a sequela of this operation.

In the early history of this operation criticism was offered on a ground of incorrect prognosis, but it is very gratifying to me to find

eminent surgeons in the United States as well as in Europe commending and adopting the method here advocated.

Discussion. *Dr. W. J. Roe,* Philadelphia: The point which Dr. Brophy makes, that in cases of congenital cleft of the palate and alveolar process there is not only a cleft but a separation, and consequently an increase in size of the nasal chambers, has been verified in my experience. Since he gave his instructive paper and presented cases before this Association three years ago, I have given the subject careful study and heartily concur in his conclusion, having seen this condition in such cases as he describes. In those cases which I have treated by the Brophy operation I restored practically the normal size of the nasal chambers, and replaced a portion of their lateral walls to what their position should have been.

Dr. B. G. Maercklein, Milwaukee: I wish to protest against the manner in which these cases are usually treated. Any number of physicians and surgeons defer this operation until later childhood or adult life and nothing could be more detrimental to the interests of the patient. In the cases which Dr. Brophy presented three years ago the ability to speak correctly was most striking. I do not understand why it is not possible to produce as perfect speech after the age of sixteen to twenty as we secure after operations upon children. Ten years ago I operated upon a child ten years old, and its speech is now practically perfect. I operated on two cases, sixteen and eighteen years of age respectively, and the speech is defective and probably always will be. The only explanation I can give is, that it is owing to the lack of proper training of the muscles of speech in early childhood. I have likened it to the condition of an adult foreigner who attempts to acquire our language. It is almost impossible to get rid of the peculiar foreign articulation, and his pronunciation of certain vowels is invariably defective. This is attributable only to the lack of cultivation in early childhood, for a child of any nationality, if brought to America early in life and thrown among English-speaking people, will pronounce our language as fluently, as perfectly, as anyone can. When we operate upon these cases of cleft palate in infancy, making a more perfect approximation than we can in adult life, giving the patient the benefit of years of training of those muscles, we are bound to secure better results than in later operations. I recently saw a case of Dr. Brophy's of a double cleft, a double hare-lip, the intermaxillary bones projecting and being

attached to the tip of the nose and the points of the vomer. A more complete case of deformity of this kind could hardly be imagined, yet both jaws were successfully approximated, a bony union took place, the intermaxillary bones were subsequently reduced, and finally operations, first on the soft palate and afterwards on the double hare-lip, were successfully performed. In my opinion that child will acquire perfect speech by practice, and it could not possibly have acquired any speech with such a deformity existing.

Dr. Thos. Fillebrown, Boston: I do not see how any man could use such pictures to prove that the nasal passages would be contracted by the operation performed by Dr. Brophy, for the maxillary bone is separated from the nasal wall and the nasal passage is not narrowed at all. I can produce patients enough to prove that the nasal passage is not contracted in the least. I am sure those pictures were produced by a man who had not done the operation according to Dr. Brophy's method.

It is not correct to state that you cannot produce as satisfactory articulate results in an adult as in a child. My children have not reached adult life, so I cannot tell what the final result will be, but I have a phonographic record that was taken of a patient sixteen years old within three weeks after an operation for cleft palate. Before the operation he could scarcely make himself understood, but I will leave it to any man who listens to this record to say if the speech is not as good as in the majority of people. A month after the operation his teacher stated that it would be impossible to pick him out of a crowd by his voice, and I can produce several patients who will show equally good results.

Dr. Maercklein: I accept Dr. Fillebrown's statements as to these particular cases. He may produce individuals operated upon in adult life who have become as proficient in speech as those operated upon in infancy, but as a general proposition my statement is correct, that this seldom happens.

Dr. R. Ottolengui, New York: I agree entirely with Dr. Maercklein's proposition—that the only hope of correcting a cleft palate, by which I mean the restoration of the organs so that perfect speech may be attained, lies in early operation. The evidence advanced by Dr. Fillebrown is entirely negative, for the fact that certain operations in individual cases have resulted in perfection of speech does not in any sense inveigh against the principle that the earlier the

operation the better. I have seen persons with large clefts in their mouths who might mingle freely with this audience and not be detected by their speech. The few successes which Dr. Fillebrown has had—that is, few in proportion to the many thousands of operations that have been performed upon adults—do not weigh at all in the balance of the argument that surgical operations performed upon adults prior to those of Dr. Brophy have been a failure and a blot upon surgery. What success Dr. Brophy has had with his operations on adults, or on children old enough to have acquired bad habits of speech, seems to me very largely dependent upon his technique and upon a point which in the past has been overlooked by surgeons, and which at present, with the exception of one or two men, has been ignored by dentists when attempting to restore speech by artificial means. Surgeons and dentists have taken the cases as they have found them, and have attempted to simply occlude the sides of the cleft—in the case of surgery by plastic operation, and to plug them up in the case of dentistry. Sometimes the result was a high vault which the tongue never reached in articulating those sounds where it was essential that it should touch the roof of the mouth. Dr. Brophy's operation peels the soft parts away from the palate bone and brings them down so that an entirely different vault, less in height, is produced, thus enabling the tongue to reach those parts, and thus producing satisfactory speech. The same is true of the Kingsley obturator. This is not simply a plug in the back of the throat, but in all cases the mouth is studied and the plate is made not to form too high a vault, but to bridge it and produce a lowering of the dome, thus allowing the tongue to reach the roof of the mouth in the formation of those sounds. It would surprise me very much to find that the phonographic records of Dr. Fillebrown are of any value. While the articulation may be very often obtained by surgical or mechanical means, one of the most difficult things to overcome is the nasal resonance, and I have never heard a phonographic record, even from a normal voice, that did not conspicuously show what seemed like nasal sounds. Consequently those records would not indicate at all whether or not the patient had overcome his nasal resonance, and would give an entirely inadequate report of what he could do. It seems to me that some of the plastic operations might be much improved, and especially that if the nares could be properly occluded anteriorly and

posteriorly the nasal resonance would be overcome. In making an obturator it would be of advantage, before making the final instrument, to test it in the mouth for days at a time, building up or cutting down as needed, to see whether the nasal resonance could be overcome.

Dr. Brophy, closing discussion: I brought out these pictures to show beyond the question of doubt that the operation which I have devised cannot close the nasal passages. I have never referred directly to the utterances against this operation, based on the supposition that it would cause nasal stenosis and produce greater deformity than that which previously existed. This statement was also made in a textbook written by Dr. Marshall, and it was not based upon any positive information but upon a theory. I recently made sections of an infantile cadaver to show the normal relation of the walls of the nares, the relation of the upper to the lower jaw, the expansion of the nasal passage in deformed patients, and to establish the fact that the upper jaw is widely spread. As Dr. Roe has stated, we have not only a cleft throughout the length of the palate, but having that cleft the separated maxillary bones grow wider apart by reason of the force exerted upon those inclined planes within the alveolar borders by the pressure of the lower jaw, and I contend that this occurs in embryo. I am entirely satisfied that this spreading occurs before the child is born and continues up to the time when the process of ossification is extended so that the bone will no longer readily yield to the pressure of the lower jaw upon the inclined planes formed by the arch of the upper jaw.

I have long been on record as urging early operations, though I recognize the value of later operations, because we sometimes restore perfect articulation in them, but in other cases this is impossible.

Dr. Kingsley reports the case of a man for whom he adjusted with the greatest of care an obturator, and who in the hands of an elocutionist learned to use the instrument so that he could speak very well. Later he developed a nasal tone and lost to a considerable extent the results of the training, simply because he grew careless. No matter what sort of a palate is made for a patient, no matter how perfect it may be, and no matter how successful technically the operation may be performed, he will continue to speak badly unless he is carefully trained. Dr. Kingsley has clearly and beautifully outlined the behavior of the tongue in the enunciation of sounds, and

has shown its position in pronouncing certain ones. Take for example the consonants, t, k and s. To pronounce the letter t the tongue must be placed against the upper incisors or back of them, and then quickly retracted as the expulsion is made to produce the sound. These consonants always bother a cleft-palate patient, and in trying to pronounce the letter t the tongue will lie flat on the floor of the mouth, and he will make a terrific expulsion of air, but to no purpose. All of the technique and mechanical manipulation of the tongue must be taught a cleft-palate patient who speaks badly.

ETIOLOGY OF DENTAL DISEASE.

BY J. D. PATTERSON, D.D.S., KANSAS CITY. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, MAY 21-23, 1902.

In the study of dental disease, while the general principles are the same with regard to pathological changes as in other parts of the body, there is in the local surroundings of the buccal cavity much of local influence, both in the causes and course of disease, that adds interest and renders the study of the causes of dental disease different from other parts of the body.

There are two potent points in this differentiation: first, the greater exposure to outside influence, as different temperatures, contaminated air, or foreign matter; and second, because of the fact that the mouth furnishes in many respects a breeding-place for bacteria not found in other regions, and because the fermentative and putrefactive processes are here of very frequent occurrence compared to any other localities; and lastly, we may add, on account of the strange omission of hygiene, where in the place of all others it is so *demanded.* Our attention has recently been strongly directed to the unusual conditions favoring disease which are found in the mouth, by the following from Dr. Hunter of England, in a paper read before the Royal Medical and Chirurgical Society. He says: "The whole subject of oral sepsis as a cause of disease has been one of especial interest to me for many years, and the more I study it the more I am impressed with its importance, and amazed at the extraordinary neglect with which it is treated by physicians and surgeons alike. I have to point out that for every case of gastric or other affection traceable to pyorrhea alveolaris, a hundred cases equally marked are daily to.

be found associated with other dental and oral conditions of sepsis. In my own experience they include not only pyorrhea alveolaris, but stomatitis and gingivitis of every degree of severity—erethematosa, ulcerosa, gangrenosa, and every form of trouble, dental and oral, producible by septic infection. In relation to the whole group of internal conditions caused by pyogenic organisms, I consider there is a wide field of preventive medicine open by the exercise of oral antisepsis—a field that can be worked in with the most surprisingly satisfactory results alike to physician, surgeon, dental surgeon and patient."

The foregoing words are very pregnant, and point with authority to the frequency and potency of dental disease. Given, then, the proposition that dental disease is of so much importance in general pathological conditions, it is of the greatest necessity that we, as dental surgeons, understand well the etiology of those diseases; for in our hands lies the work of preventing or curing them. This is a work of the first magnitude and demands the most painstaking consideration.

It may be stated at the outset that the large majority of the most destructive dental diseases at their inception result from an unsanitary condition of the oral cavity. In my opinion there is not the slightest reason why the mouth, because it is so easily accessible to local measures, should usually be a veritable hotbed for the development of pathogenic bacteria. It has been said that it is impossible to keep pus-organisms out of the mouth, but that does not excuse the prevailing disregard of the simplest methods of preventing fermentation, pus-formation and putrefaction. Any intelligent and observing practitioner of dentistry can count on his ten fingers the number of his patients who habitually and regularly mechanically cleanse and medicinally sterilize the mouth. Each dentist of full practice has from 350 to 500 patients during the year. Out of that number it will be found that about two per cent only have cared for the condition of the mouth in a manner demanded by modern knowledge. Scarce one mouth in ten is devoid of nauseating odors of putrefying matter, and the dentist longs constantly for a sterilizing mask to shut out from his nostrils the sour smells of fermentation or the putridity caused by saphrogenic bacteria. The origin, then, of this monster of sepsis is in almost criminal negligence. In my opinion it is greatly the fault of the dentist, because in so far as his

work is usually done it reaches only the placing of fillings, crowns or bridges, with little or no care to remove accumulations of food and calcic deposits, which usually spread more terror than the ravages of decay. The average operator is daily importuned with this inquiry when a certain line of operations are completed: "Now are you sure my teeth are all right?" If all fillings that are easy of access are completed, all needed crowns or bridges made, the answer is, "Yes, I can see nothing more to do at present." Usually it is a fact that there remain irritated gum tissue to be made well by the removal of fermentation and the putrefaction nests, the usual accompaniments of calcic deposits from saliva, or inflammatory exudations and pus, but our average operator will be blind to everything save places for easy or showy fillings and crowns. The dentist is thus trusted by his patient, and the confidence is abused and the honor of dentistry is made a travesty. It is this lack of conscientious effort which inaugurates or permits the alarming unsanitary conditions which introduce in train the gravest disorders of caries and its subsequent sequences—stomatitis, aphthæ, catarrh, pyorrhea, cancrum oris, noma, absorption of gums and alveolar processes—all having their origin in the accumulation of food detritus and fluids of the mouth, which constitute hotbeds for destructive changes in which infectious material is rapidly formed by the life processes of the pathogenic microorganism. Now, while I am a thorough believer in the possibilities of prevention of dental disease, I am not very sanguine that I have a method which is a working one on the patient's part. I believe that it can best be done by the dentist with each individual patient, but I am not yet of the belief that the dentist is ready to do his whole duty. There is an antipathy with many, in the first place, to do work which should be done by the cleanly patient. It is said of one of the old-time dentists, Isaiah Forbes of St. Louis, that he bluntly refused to do this scavenger work, and felt insulted if requested to do so. There are many following Dr. Forbes, but it is on account of indolence and lack of remuneration instead of pride.

When we look over the whole ground we surely must conclude that the patient's efforts to abate unsanitary conditions *must* be supplemented by the dentist; and the dentist who will not do this work, or slights its doing, should seek other fields. I candidly confess that I often refuse to operate in a mouth until some effort is made by the patient to do what may be possible, and when I find that preaching

is in vain, I simply say I am through with the treatment and with the patient.

It may be inferred from the foregoing that the burden of this brief paper is a plea that the dentist shall, by his conscientious work in removing all factors bringing about dental disease, do his whole duty in eradicating or preventing the cause of dental disease. *I offer no apology when I charge the rank and file of the profession with almost criminal neglect on this point.* The easy, pleasant work, with fees undisputed, is what we are usually after, and no search is made for obscure decay which is difficult of access, or gum-irritation which is unknown to the patient. When all is said as to the culpability of the patient in neglecting oral hygiene, it still remains true that complete oral antisepsis can never be accomplished without the aid of the careful dentist; so we must never try to excuse *our* neglect because the patient's own neglect is often beyond comprehension; for with the patient's most punctilious regard for modern oral hygiene, there will still occur in concealed places the deadly work of bacteria, or calcic precipitations will thrust their knife-edged particles against oral mucous membrane, until destruction of its function and inflammation result.

In the etiology of dental diseases very much depends upon the character of tissue, as well as the environment. The possibility of infection and the rapidity of pathological and destructive change in dental tissues are nowhere more dependent upon the character of the tissue itself, and this is largely a matter of heredity. This is a proposition which, so far as the writer is aware, is new in the consideration of disease. It is accepted without cavil that tissues are all alike in different animal organisms of the same species, and that the therapeutist shall treat all alike. This is a hypothesis alike unjustifiable and unscientific, and leads to the strange statement that every cell is identical in vitality unless affected with specific virus. It is not so long since Dr. Black proved to us that the tooth which rapidly succumbed to disease had the same amount of organic and inorganic material as its counterpart in another mouth which resisted the attack of fermentative processes, and that the fault lay in the structural arrangement and combination. This fact was first published to the world by J. R. Brownlie of England in 1875, in the *British Journal of Dental Science.* Can it be doubted that the same condition exists in the soft tissue and in *all* tissues? It is beyond

comprehension that every untainted cell has the same vitality and ability to form and maintain tissue. Thus we deal with tissue of various degrees of vitality and ability to war against infection and destruction. This is especially noticeable to the student in dental disease, as the gingiva with its territory of attenuated circulation and liability to irritation at times falls rapidly to destruction under the slightest irritation, while again it stands firm, clings to the cervix of the tooth and maintains its function undisturbed. We believe, then, that in studying the etiology of all disease, and notably of dental disease, that the *character* of the tissue will soon be an acknowledged factor for or against the inroads of injury and infection. In tissue where the vitality—be it in tooth-substance or in mucous membrane—is below average ability to resist the encroachment of disease, the dentist must be especially on the alert with methods of prevention. Our function, unfortunately, cannot begin usually at as early a period as we could desire—viz., in the fetal life, but when opportunity affords may we all preach the doctrine of good nutrition, good food, good supply of oxygen, exercise, living and sleeping in good air, so that to the child may be bequeathed the best dental tissue the cells are capable of forming. Then when the tooth *is* formed—when our universal and every-day work begins—let us stand at the threshold, at the door where enter the greatest number of all bodily diseases, and see that the environment of dental tissues shall be perfect; that exercise and scrupulous care shall so keep them. Then will we do our first duty, and the people we serve and our own consciences will reward us.

COMPRESSED AIR IN DENTISTRY.

BY B. E. SAUNDERS, D.D.S., ELYRIA, O. READ BEFORE THE NORTHERN OHIO DENTAL SOCIETY, JUNE, 1902.

Compressed air has fittingly been called "The Infant Industrial Hercules" or "The Baby Giant." By its force, provided we had enough of it, we could move the earth. Barring electricity, it is without doubt the coming force in the manufacturing and building world. Its application to problems of dentistry has begun to receive attention, and in the near future a compressed air appliance will, I think, prove to be a necessary part of our office equipment.

It was about two years ago, while being treated for throat trouble

by a physician, who used a compressed air nebulizer, that the possibilities of compressed air in dentistry suggested themselves to me, and I commenced employing this agent in a series of original experiments, where its use has assisted me in more successfully treating cases which present themselves daily to the average practitioner. Not being fortunate enough to be located in a building which has its own compressed air plant, as many of the modern city offices have, it was necessary to construct one of my own. The parts were readily supplied by a dental supply house, and consisted of a metal tank 36 inches high, 18 inches in diameter, capacity 18 gallons, supplied with a gauge to denote the pounds pressure, and two valves, a supply valve and an exit valve. After the air leaves the gasometer by its exit it passes through a second valve called the controller, which by manipulating with a set-screw gives the required amount of pressure at your handpiece, in which is valve No. 3, which works automatically, at the discretion of the operator, thus keeping the air blast at all times under perfect control.

The air compressor may be a hand instrument, as a large bicycle pump, or may be run by electricity or water pressure. I prefer the latter and have a Monitor water pump connected with the city water supply pipe. This gives a constant pressure of air in the tank of from 40 to 60 pounds. It is not necessary to have pump and tank in the same room, the neater plan being to have both outside the operating room, and a pipe leading from the tank to the controlling valve, which may be fastened to the wall in close proximity to the chair.

The many uses of this valuable agent in our practice readily suggest themselves. In the treatment of pyorrhea alveolaris it is invaluable. A blast of air can be directed into the pockets, inflating them and so rendering the tartar deposits along the root visible. They may then be removed accurately instead of fishing for them "unsight and unseen." After the deposits have been dislodged they may be successfully driven from the pockets by a blast of air attached to an atomizer, and all pockets washed out and rendered sterile by an atomizer containing the favorite solution of the dentist. I know of no greater help in the treatment of this disease than the air blast and a good atomizer with sufficient pressure to be effective.

In the treatment of that ever-sensitive structure, dentin, I have found compressed air very reliable. Not being an enthusiast on the

subject of cataphoresis, I am not prepared to state how they compare, but do know that a blast of warm air from a hot air syringe directed into a cavity previously treated with an application of ether, or better, an ethereal solution of cocain, gives amazing results. When I speak of a current of warm air I do not mean hot air, but air about 112° at the cavity. I believe, as does Dr. Black, that a too sudden drying of the tooth structure is liable to check it, and that greater harm than good is accomplished, especially in the case of dead teeth.

In using warm compressed air it is necessary to consider the fact that expanding gases (such as air leaving the nozzle of a syringe) are cooler than when under constant pressure, and if using the metal coil immersed in hot water, or the electric coil, the air in the coil must be about 122° to produce 112° at the cavity. I have found this temperature to be best for the treatment of root canals and dead teeth. By the use of compressed air I think it is possible to more thoroughly disinfect and medicate a root canal than by any other method, as all portions are positively reached. Fistulæ abscesses are easily treated, sterilized, dried, medicated and filled by forcing the agents employed in the treatment into the infected parts by a mild air blast.

Before taking impressions I usually spray the mouth thoroughly with a mild antiseptic, which removes the secretions, and if the impression is to be taken with modeling composition, use the saliva ejector and hasten the setting by directing a cold spray from the atomizer on the compound, assuring a more positive result. Compressed air is a substitute for the rubber bulb chip blower when preparing cavities, and a gentle blast into the cavity while the bur is in operation not only removes the debris, but prevents the tooth becoming heated. Also a constant blast while using the paper disk in finishing fillings prevents to a large degree the unpleasant heating, and allows the operator to work more rapidly.

After cleaning teeth, and in fact at the close of any operation, a warm spray from the atomizer containing a pleasant antiseptic not only thoroughly disinfects the mouth, but removes the collections and debris, and leaves the mouth in a more pleasant condition than before the operation. It is the most positive way to disinfect diseased lesions, and especially before and after extracting roots and teeth.

Not only is compressed air valuable in the operating room, but in the laboratory, where it is a substitute for the bellows when using the blow-pipe for soldering and heating. The flow of air is so constant and steady that it is par excellence for soldering crowns or bridgework containing porcelain. Its use is so universal in the dental office that it seems to play an important part in nearly everything an ordinary dentist is called upon to do.

ALVEOLAR ABSCESS; ITS SEQUELÆ AND SURGICAL TREATMENT.

BY F. B. MOOREHEAD, D.D.S., CHICAGO. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, MAY 21-23, 1902.

An abscess is a circumscribed collection of pus in the tissues; a product of bacterial activity. Sutton has arranged this activity in a zoölogical story form, which reads as follows: "The leucocytes are the defending army; the vessels, its lines of communication; the leucocytes being, in effect, the standing army maintained by every composite organism. When this body is invaded by bacteria or other irritants, information of the invasion is telegraphed by means of vaso-motor nerves, and leucocytes are pushed to the front, reinforcements being rapidly furnished, so that the standing army of white corpuscles may be increased to thirty or forty times the normal standard. In this conflict cells die, and are often eaten by their companions. Frequently the slaughter is so great that the tissues become burdened by the dead bodies of the soldiers in the form of pus, the activity of the cells being proven by the fact that their protoplasm often contains bacilli in various stages of destruction. These dead cells, like the corpses of soldiers who fall in battle, later become hurtful to the organism which during their lives it was their duty to protect, for they are fertile sources of septicemia and pyemia."

However, it is not our province to deal with this subject from the standpoint of pathology, but rather from a clinical or practical standpoint. Time will not permit us to go into the etiology and symptomatology, yet a few words are necessary. An abscess is always the result of suppurative inflammation, the symptoms of which may be briefly enumerated as calor, rubor, dolor, tumor,

et functio laesa, and is always caused by the presence of one or more kinds of pathogenic microbes.

The diagnosis is not attended with any difficulties. There is one condition, however, which might lead us astray—viz., aneurism. The late Moses Gunn, who was a conservative and skillful surgeon, once incised an aneurism located on the tuberosity of the superior maxilla, thinking it was an abscess. The well-defined method of diagnosing aneurism, if followed, will save us from an embarrassing position. The old rule, *"Ubi pus ibi evacuo,"* applies to the treatment of an abcess as strongly to-day as it did in the days of Hippocrates. Once the abscess has been freely opened, various therapeutic measures may be elected. The treatment in the acute stage is usually through the root-canal of the affected tooth. The ordinary means employed will usually result in a cure. We do not desire, however, to discuss acute abscesses, but rather those which have stood for one or more years, and have failed to respond to therapeutic measures or have not been treated at all. Now, if there are no complications, these cases may readily respond to therapeutic measures, even though they are of long standing. The complications then, or sequelæ, must be considered in the treatment of chronic abscesses.

1*st. Necrosis.*—Necrosis is a condition, not a disease. It may be caused by specific bacteria, putrefactive bacteria, decubitus, trauma, defective arterial blood-supply, obstructed venous circulation, ischemia or inflammation. According to Senn, "Inflammation may produce necrosis in two different ways." 1. Exudation and transudation take place so rapidly that complete stasis is produced by the extravascular pressure. 2. The bacterial cause of the inflammation is present in such large quantities that the vitality of the tissue is destroyed directly from this cause. The predisposing causes of necrosis are syphilis and tuberculosis.

2*d. Caries.*—In dental practice this disease may be compared to suppuration in soft tissues. It is the devitalization of bone cell by cell, and its breaking down by a comparatively slow progression, rather than by death *en masse.* (Barrett.) There are three forms of caries: caries siccas, caries humida and caries necrotica. The predisposing causes of caries are scrofula, syphilis and tuberculosis.

3*d. Pus.*—The pus may burrow its way into the anterior nares, posterior nares or maxillary sinus, and discharge there permanently

or until arrested. Although the pus will usually find exit through the alveolar walls, the external plate is composed of compact tissue and many offer such resistance that the pus will burrow through the cancellous structure and appear on the surface some distance from the diseased tooth. Thus in one instance we saw a case where the abscess was located above the right superior cuspid and the sinus was on the opposite side of the jaw between the second bicuspid and first molar. Again, we may find the sinus in the median line of the palate. "Pus has been known to burrow along the fibers of the platysma myoides until it reached the clavicle, or, penetrating the cervical fascia, finally strike the omohyoid and follow its course until it merged at the point of the scapula." (Barrett.) There may be a slight discharge of pus into the antrum, causing a catarrhal inflammation of the mucous membrane, which may be transmitted to the Schneiderian membrane by continuity, resulting in nasal catarrh. Inflammation of the Schneiderian membrane may travel upward through the infundibulum and involve the frontal sinus.

A most remarkable case came under our observation recently. A young lady presented herself for treatment with badly swollen face. She was then suffering intensely, pulse rapid and weak, temperature 101.5°. Upon examination we found the right superior central incisor badly decayed, elongated and sore to pressure; all the surrounding soft tissues were infiltrated with pus. We made a liberal incision in the tissue above the affected tooth, from which the pus escaped in enormous quantities. A strip of sterile gauze was inserted for the double purpose of keeping the opening patulous and affording better drainage. After proper instruction and constitutional treatment the patient was dismissed, to return the following day. At this time we were able to make a more thorough examination, and discovered by the aid of a strong light that both antra were involved in the suppurating process. The patient refused to submit to an operation and left without proper treatment. We were called to see her at her home a few days later, and found that the acute suppurative inflammation had extended upward, involving the right frontal sinus. The right side of the face was terribly swollen, the eye on that side being closed, and the patient presented a clinical picture of septic infection. Vigorous constitutional measures were instituted, and after the acute condition had subsided the patient was anesthetized, and both antra, together with the right frontal

sinus, were freely opened. Proper treatment was regularly carried on for ten days, when the patient removed to another part of the city, making it impossible for us to continue the treatment. After a lapse of several months she again returned, this time with an extensive necrosis of the alveolar process. While the patient has a history of specific infection, the abscess resulting from the death of the pulp in the tooth named was the direct cause of the necrosis.

We not infrequently see cases of chronic abscess with a sinus discharging under the chin, or at some point on the inferior border of the lower jaw. Garretson reports the following case: A young man in whom the roots of a lower third molar had been filled was attacked with acute maxillary periostitis and osteitis. This was sufficiently severe to excite inflammation in the loose connective tissue between the mylohyoid muscle and the jaw. An abscess followed here, and the pus gravitated to form a collection about the hyoid bone, and from that point passed upward upon the face in the line of the facial artery. The abscess in addition pressed directly upward against the floor of the mouth and caused unilateral glossitis, from the mechanical effects of which upon the organs of respiration the patient died. The duration of the extramaxillary complication was but four days.

Mr. Fleischman reports the case of a young girl who had been troubled with a constant though not profuse discharge of slightly purulent mucus from the right nostril; it appeared to be the sequel of a cold. The mucous membrane, so far as it could be examined, was healthy, and there were no indications of any morbid growth. She was ordered a strong injection of gallic acid, and took concurrently small doses of sesquichlorid of iron. The only benefit she derived was that the discharge lost its purulent character; in amount it remained about the same, though the treatment was long persevered in and other local astringents tried. Not being able to find anything wrong in the nasal passage, the mouth was examined, and the right superior cuspid was found to be carious and was removed. The discharge was much lessened the next day and disappeared entirely within a week. A competent dentist would have treated such a case in an entirely different manner, saving the tooth. We might go on indefinitely reporting cases illustrating the fact that "Mighty oaks from tiny acorns grow," and that the *fons et origo mali* are not to be found where we first examine for them.

4th. Cysts.—Cysts formed as a sequela of alveolar abscess are not true cysts. In certain cases the pus, instead of causing an absorption of the bone, forming the so-called "absorption area," produces a "bulging" of the external plate. Because of some *locus majoris resistentiae* the pus is reabsorbed, and the acute process, if such existed, passes away. There is a sterile exudate, plastic in character, poured out, which fills the newly formed cavity. This after a time becomes organized into true fibrous tissue. The tissue first formed seems to be in the outer zone, with a middle zone of plastic exudate partly organized, and an inner zone of substance resembling mucus. There may be marked deformity, as in two cases seen in Dr. Brophy's surgical clinic, and in a case reported by Dr. Barrett. In the differential diagnosis of these cases osteoma, osteosarcoma, fibroma and enchondroma must be excluded.

In approaching the subject of treatment of chronic alveolar abscess, we are not unmindful of the fact that there is a strong prejudice, both among the laity and not a few of the profession, against operative procedures. Frequently we hear practitioners make the statement that they never saw an abscess they could not cure with one treatment; some say possibly two or three treatments. We are prepared to make the statement, however, that there are cases which will not respond to therapeutic treatment. Where there are necrosis, caries, antral affection, cyst, or an extensive "absorption area," medication is worthless, surgery alone offering a hope of permanent cure. Of course many of these cases can be cured by extracting the offending teeth; yet we meet with conditions where such treatment is absolutely of no avail. Even though the removal of diseased teeth solves the difficulty, such a procedure is to be condemned on general principles. It is the duty as well as the function of the dentist to save teeth, not to remove them. The question arises, Can the teeth involved be saved where there is necrosis? We do not hesitate to state that in a majority of cases they can be saved. A properly constructed appliance, extending to the proximal sound teeth and cemented in place, will hold *in situ* those involved during the operation and until new process has formed around them. In caries an appliance is rarely necessary; the carious bone, together with the absorption area, may be thoroughly curetted without disturbing the teeth.

Given a case of say five to ten years' standing, selecting for

description a superior cuspid: Upon examination we find the soft tissues congested with venous blood, with a sinus in the neighborhood of the apex of the tooth discharging pus. We proceed in the usual manner to treat this case through the tooth. First we inject distilled water, forcing it through the sinus; then we use peroxid of hydrogen, phenol, Black's "1-2-3," oil of cloves, lysol, cajuput, borolyptol, listerine and what not. We do not use them concurrently, but we give each of them a trial, and the case does not get well. Why? First, because the solution injected passes out through the sinus and does not reach the diseased bone. Second, because of the *locus minoris resistentiae,* due to deficient blood-supply, the tissues are unable to throw off the particles of dead bone, and the destructive process slowly advances. We have given our therapeutic agents a fair trial and they have been "found wanting." (We should like to put it in this instance, "Surgery forever on the scaffold, therapeutics forever on the throne.")

Our patient becomes discouraged and we become disgusted, and finally resolve to adopt a more rational method of treatment. Our first step is to thoroughly cleanse, dry and fill the root-canal. Then, with the patient anesthetized and the field of operation prepared, we make a liberal incision over the diseased area, reflecting the soft tissues together with the periosteum, exposing the external plate of bone, which we penetrate with a small drill in the dental or surgical engine. This opening is enlarged to the desired extent with a fissure bur. With a sharp curet we next remove every vestige of diseased tissue. This may be accomplished by using a large, round bur in the engine. It is not difficult to determine when the diseased tissue has been removed. The sensation produced by contact of the curet or bur with living bone will be a safe guide.

In cases where the apex of the root has become roughened, and the peridental membrane has been destroyed, it should be removed. This may be done with a fissure or large round bur. The edges must be carefully rounded so there will be no sharp corners to act as irritants and thus prevent the formation of granulation tissue. The cavity is then packed with iodoform or carbolated gauze. On the second day the packing should be removed, and the cavity irrigated with, preferably, a hot saturated solution of boracic acid, especially if there is much pain. The cavity is then repacked with carbolated gauze. The treatment from this on will depend largely

upon the amount of tissue removed and the local and general condition of the patient. As a routine practice we irrigate and repack every day for ten days or longer. After the swelling and soreness have disappeared a gutta-percha plug may be substituted for the gauze packing. By thus keeping the orifice open, granulation tissue will form at the bottom and soon fill the entire cavity, which in turn will be organized into bone, periosteum, mucous membrane, etc. If the antrum is involved, open it freely, curet if necessary, pack and treat as above mentioned. If there is necrosed or carious bone, extend the operation to healthy tissue, regardless of the extent of involvement. Dead tissue is never utilized by Nature in the process of repair.

In advocating such treatment as we have briefly described, we recognize the fact that we are trespassing on the long-accepted methods; but we invite those who have practiced the old method to treat these obstinate cases surgically, and we have no fear for the results. We base these statements not upon theory, but upon clinical experience. Experience is the best authority. Experimental tests are the best tests. We do not court, but anticipate criticism, for we always have with us those who believe that "the old ways are best." To such we have this to say: Treat all those cases which may be successfully treated therapeutically, and then be honest enough to admit that there are still a large class of cases which will not respond to medicinal treatment. For this latter class the treatment outlined is *per se* rational and efficient.

PARAFFIN INJECTIONS IN FACIAL ATROPHY.—A. Luxenberger (*Muench. med. Woch.*) states that the deformity resulting from progressive facial hemiatrophy in two young women was completely cured by the injection of paraffin according to Gersuny's directions. One case was very extensive, requiring fourteen injections of small amounts of paraffin in the brow, temple, nose and cheeks, with massage afterward to model the parts symmetrical with the other side. In the second case the atrophy was restricted to the lower jaw, and four injections were sufficient to restore the cheek to its normal outlines. There was a slight smarting after each injection, with the sensation of a foreign body in the cheek, but this all passed away in the course of half a day. The mixture of soft and hard paraffin, called in Germany "white American vaselin," which is used for these injections, does not produce irritation even when comparatively large amounts are used. Straume found that animals tolerated three to ten grams per kilo of the body-weight. In Luxenberger's two cases the appetite, pulse, temperature, respiration and urine showed no trace of disturbance during the course of the injections.

Digests.

SOME OF THE EFFECTS OF AUTOINTOXICATION UPON THE TEETH AND SURROUNDING TISSUES. By L. G. Noel, D.D.S., Nashville. Read before the Tennessee State Dental Association, July, 1902. The hair, nails, and teeth have been classed by anatomists as appendages to the skin. That this is a correct classification becomes clear in the light which a study of the physiology and pathology of these organs brings to the subject, for all seem more or less to suffer injury and malnutrition during the course of those diseases which expend their force upon the integuments. We have falling of the hair in many of the eruptive fevers. Many forms of illness express themselves and mark records of their duration by changes in the color and texture of the nails, which usually become whiter and more brittle in sickness.

One of the most characteristic symptoms of secondary syphilis is dryness of the hair and its rapid falling during the progress of the disease. This is evidently due to a disturbance of its nutrition by the specific poison with which the skin is charged. In inherited syphilis the teeth are faulty in their development, presenting the shortened, stunted crowns, with notched and ridged enamel, described by Hutchinson, and therefore often called "Hutchinson's teeth." Measles, when occurring at the time the teeth are in a formative stage, leaves its markings in faulty development of a most characteristic kind. Scarlet fever also leaves its traces, to last throughout life in similar faults of development. Diphtheria often goes farther, and produces necrosis of the maxillary bones, especially of the alveolar portions, causing the destruction of large portions of the bone, with the contained teeth.

All these disturbances of development and growth are the effects of toxic elements left in the tissues by disease, or the functional derangements of the organs of the body caused by the specific poisons of different maladies. There are, besides these, functional disturbances of an everyday kind, the results of bad habits of living, unhygienic methods in diet and exercise, failure to take proper care of the skin, the too great consumption of proteids, with too little exercise, the drinking of too much alcoholic stimulant and too little water—in short, the natural consequences of many grave errors of omission and commission.

All of these leave their impress upon the gums and pericemental membranes so notably that the old practitioner of dentistry need not possess the powers of discernment of a Sherlock Holmes to enable him to guess the habits of his patient upon looking in his mouth. If the drunkard has not a well-marked case of drunkard's stomatitis it is only because he has not yet gotten that far; his overindulgence in due time will surely leave an impress upon the mucous tissues. The observant practitioner reads the habits of his patient in the color of his skin, the white of the eyes, the amount of fat he has stored. The *tout ensemble* of his person tells tales of overindulgence at table, neglect of exercise, neglect of the orthodox uses of soap and water, and numerous violations of the commonest laws of health.

Any long-continued disturbance of the nice balance of function between the great emunctory organs will result in an accumulation of toxic elements in the blood that will leave their impress on the gums and peridental membrane as surely as upon the skin and mucous surfaces throughout the body. The skin being one of the principal eliminating organs of the body in health, its office being to remove large quantities of water, and through this menstruum quantities of effete and poisonous material, whenever its function is impaired by disease we have these poisons manifesting themselves in eruptions and blotches, ulcers, carbuncles, boils, and various blemishes, until the hair falls, the nails become defective and brittle, the teeth become loose, and pyorrhea alveolaris sets in.

That the skin is immediately in sympathy with the other great emunctory organs is manifest by its behavior whenever from any cause their functions are arrested or disturbed. Acting vicariously for each other, we find each ready to take up the work of the other until the limit is reached; then we come to the line of demarcation between health and disease. In very hot weather we have the skin and lungs removing nearly all the water from the system. At such times the secretion of urine is scanty and high-colored, heavily charged with urea, urates, and other waste products, showing that the major portion of the water has found exit by the lungs and skin. On the other hand, in very cold weather the urine is abundant, not high-colored, and much less heavily charged with waste material. Now note what takes place when either of these organs fails in the faithful performance of this vicarious work. If in hot weather the kidneys fail to eliminate the urea, we have its poisonous effects mani-

fested upon the skin in the eruption popularly called "heat rash," or maybe in some more virulent form of rash; while in cold weather a foul and unclean skin may easily overwork the kidneys, ultimately precipitating organic disease of their structure.

Many cases of falling of the hair are clearly traceable to disease of the scalp brought about by derangement of those organs whose office is the removal of waste material from the body. Indeed, we could not expect the hair bulbs to continue healthy when the enveloping tissue has become diseased from the presence of poisons which the skin has been vainly endeavoring to remove. Every observant physician has noticed the increase of dandruff on the scalp, the itching, the eruption accompanying the cessation of the normal secretion of bile, during what is popularly termed "a bilious spell." At such times there is usually an eruption upon the breast and back, supposed to be due to an accumulation of urea in the blood, for then the kidneys are overtaxed in their efforts to remove the waste which accumulates during this period of constipation.

Now what has all this to do with the health of the teeth and surrounding tissues? Let us see. Every old practitioner of dentistry has become familiar with those frequent cases of soreness in the teeth incident to the sudden taking of cold. Here we have a sudden stoppage of the healthy action of the skin and other emunctory organs. The same toxins that bring about scalp irritation and rapid desquamation are present in the gums and peridental membrane, are making themselves felt throughout all the mucous surfaces of the body; hence we need not be surprised if the membrane lining the oral cavity, the tissues investing the roots of the teeth, shall share in the trouble. So the patient comes to the dentist complaining of toothache. We find tenderness upon percussion, sometimes in several teeth; occasionally all of the teeth are involved. When only one or two teeth are manifesting this soreness, and these contain large metal fillings, the dentist is liable to fall into the error of believing the peridental inflammation is due to pulp irritation or death of the pulps caused by those fillings, and he may commit the mistake of removing the fillings, or, worse still, of devitalizing the pulps, when a little judicious medication for correcting the secretions would bring about relief.

I have alluded to the example afforded by cases of secondary syphilis, showing the effects of a specific poison upon the skin, hair, and mucous membrane. In this disease we find the peridental mem-

brane ready to take on exaggerated inflammation from every slight local irritation, such as the presence of a little scale of tartar or the rough, unfinished edge of a filling. Again, in the treatment of this affection the remedies employed often salivate, and thus establish disease of the gums and pericemental membrane. The patient suffering with secondary syphilis should be sent to the dentist as soon as secondary symptoms appear, and remain under his care until discharged as cured. Most of our city physicians recognize the importance of this, and send their syphilitic patients to a dentist promptly. Since it was suggested by Dr. Reese of Galveston in 1885 that pyorrhea alveolaris is due to an accumulation of urea in the blood, the profession has been divided into two factions on the etiology of this disease: first, those who think it is of local origin; and, second, those who attribute it to constitutional causes. Both sides have had analyses of the deposits found upon the teeth, and each side makes a good showing for itself from the standpoint of chemistry.

Prof. Peirce of Philadelphia was the first to lead off in this matter, and his analyses, made by the chemist of Drexel Institute, showed that these deposits are largely made up of the urates of lime and sodium. Dr. Black had analyses made verifying this fact, but drew quite contrary conclusions therefrom. Dr. Talbot read a paper on this subject before the Academy of Stomatology in 1869, the whole force of which was intended to combat this theory. He gave analyses of the deposits from pyorrheal teeth made by the chemist of the Northwestern University, showing that only very minute quantities of these salts could be found, and, from the failure to respond to the murexid test, that the nature of these crystals had been mistaken; that they were not uratic salts at all.

Without taking sides in this dispute, I wish to say that Dr. Talbot has been earnestly seeking to arrive at the truth of this matter for a number of years, and his opinions are entitled to due consideration on this ground. At the 1901 meeting of the National Dental Association the etiology of pyorrhea was discussed at length by the most prominent teachers in the profession, and after all had expressed their views Dr. Talbot offered what I think the most sensible view of the matter that was brought forward. This discussion will be found in the DENTAL DIGEST for December, 1901, pp. 987-1001. Dr. Talbot's remarks being very much in accord with the views above

expressed, I quote them in full. He said: "I am much surprised at this late day to hear pyorrhea alveolaris spoken of as a disease entity, and not a stage of infection. Disease of the gums and alveolar process is frequently of years' standing, and yet no pus is noticed in the mouth. Indeed, a person may lose the entire set of teeth without the appearance of pus. Inflammatory conditions of the alveolus may exist without pus infection. This inflammatory process may be deep-seated or local, so I have substituted the term 'interstitial gingivitis.' In this a local cause may produce the gingivitis, which extends into the alveolar process. In the constitutional form of the disease it becomes interstitial in character—that is, deep-seated—and the alveolar process may or may not be involved. The inflammation which results from moving in correcting irregularities, and the absorption of the alveolar process after a tooth has been extracted, should not be spoken of as pyorrhea alveolaris. The inflammatory process is deep-seated and interstitial in character. Any irritation will produce gingivitis, which invariably becomes interstitial, and no one can say where one leaves off and the other begins. Dr. Barrett does not believe it possible for any one to detect experimentally the operation of constitutional causes, but I do. I subjected several healthy young dogs to mercury, in different methods, and in a week or two they were killed. An examination of the arteries in the alveolar process and the peridental membrane was made under the microscope, and the inflammatory process, just beginning as a result of the mercurial poison, was clearly evident. There are many causes of this disease.

"Any systemic condition will produce the interstitial variety if the eliminating organs of the body are not in good condition. The most marked effects of disorder are noticed in the soldiers in the Philippines, for after they have been there about two years the teeth of many of them loosen and drop out. On the other hand, men working 6,500 meters above the level of the sea, in a cold climate, suffer with the same disease. In both cases it is nothing but interstitial gingivitis, which eventually becomes pyorrhea alveolaris. As a result of these extremes of temperature the eliminating organs do not do their work. In the hot climate, while the soldiers do perspire, insensible perspiration is checked, the kidneys become clogged up, respiration is interfered with, and autointoxication occurs. In the high, cold climate the lungs are interfered with, the skin contracts,

perspiration does not take place, so the kidneys undertake the work of the skin and lungs, with the same result.

"In scurvy and mercurial poisoning there is also autointoxication; the gums and breath of a man suffering from Bright's disease indicate how far it has progressed. Autointoxication is merely self-poisoning. The blood becomes poisoned, irritation of the inner alveolar capillaries starts up, and an obliteration of the arteries of the alveolar process results.

"Interstitial gingivitis is due to autointoxication, and it makes no difference what the cause is. It may be due to typhoid, pregnancy—in fact, any condition which interferes with the work of the eliminating organs, which produces irritation and contraction of the capillaries and inflammation long before pus infection occurs.

"If the mouth be perfectly healthy pus infection will not take place, but if the mouth be not healthy the pus germs present affect the tissues, abscesses form, and pus flows to the surface. There is only one kind of pyorrhea and one kind of pus.

"In cases where deposit occurs upon the roots of the teeth it is caused by a stasis of the blood due to obliteration of the arteries of the alveolar process. Absorption is going on, and the deposit which results is nothing more nor less than the absorbed alveolar process which is deposited upon the necks of the teeth."—*Headlight.*

NEW PHASE OF THE COAGULATION QUESTION. By A. W. Harlan, A.M., M.D., D.D.S., Chicago. Read before the American Dental Society of Europe, 1902. The history of antiseptic surgery and disinfection is indissolubly connected with the efforts to render pulpless teeth sterile and preserve them in comfort and for future usefulness to the possessor. All work in the use of disinfectants and antiseptics has been done with a view to using the smallest quantity of a known agent to thoroughly sterilize or destroy putrid and septic matter. The work of Lister, Lionel Beale, Cheyne and the long list of recent names with which you are doubtless familiar tended in this direction. The first classification of the destructive and inhibitory power of drugs over mephitic agencies and mephitic gases was that of Miguel. Later this was found in the classic of Zeigler, and it was further carried on by Klein, Wolfhugel, Magnin, Sternberg, Macfarland and others. The main object of all experimentation in this field was to discover the

properties of agents which would not be too injurious to adjacent living parts and still destroy the organisms or poisons which were inimical to life. You can see at a glance that all were working to the same end. Even the experiments of H. Knapp and others, endeavoring to show that suppuration might be produced without an organism, are of value, as were those of H. Charlton Bastian, the strenuous worker for the spontaneous generation theory, and those of Liebig, who tried to prove that fermentation was a purely chemical process, both of which in time were disproved by Pasteur.

All work of this character necessarily partakes of the personality of the experimenter. He believes in himself—he may have a theory to demonstrate, a supposed fact to prove or disprove—and his energy and enthusiasm will carry with him a few partisans who applaud, but if a new star arises who has a larger following many of the unthinking flock to the tents of the new prophet. It is not necessary here to refer to the work of Carl Heitzman on the odontoblast to remind you that great men disagree as they see things differently, and they interpret them not always in the orthodox fashion. I value most highly the work of Heitzman, because he stimulated others, encouraged them with his enthusiasm and helped them with his great learning, but not many of you now would be likely to subscribe to his views on the microscopical anatomy of the human teeth and adjacent parts. His was a striking personality, and his energy and skill carried conviction to the minds of the late Frank Abbott, Atkinson and others, but newer and brighter lights have upset most of his theories, and to-day the work of Sudduth, Allan, Andrews, Mummery, Williams, Caush and others holds a place which Heitzman could never fill.

I have gone over this little preamble to show you that you may have a theory which the facts will not bear out, and only the transforming hand of time with relentless stroke can rub it out of the catalogue of supposed facts. The history of the treatment of pulpless teeth I will not recite, as all of the teachers in schools have gone over the subject, and even the text-books have a little to say about it in these later days. Our reviews and magazines are, however, far in advance of the text-book makers. The real truths of science and practice seldom get into the text-books without the addition of the personal equation of the author. I suppose to-day the general belief is that all coagulating drugs readily pass through the sides of the

roots of teeth, through dentin, cementum and peridental membrane, because a few experiments out of the mouth showed that this was the case under certain conditions.

I will recall to your attention the experiments of Kirk, Truman and York on this subject. The main proposition of this trio of experimenters was, that if the apex of a root were filled hermetically, a drug, carbolic acid, chlorid of zinc, creosote or other coagulant, being introduced into the root by some precise method, in a few hours would pass through the root, and that a coagulum was no barrier to the diffusing of such substance through it and the surrounding tooth substance, dentin, cementum and the adjacent soft tissues. It was well known for years that coloring matters would be diffused throughout the dentin of a tooth, when soluble in water, with the single exception of silver nitrate (one of the best coagulators to be found in the whole list), but most of these gentlemen fought shy of this agent, as it would not or did not fulfill the requirements of a coagulator that would pass through a coagulum.

In order to determine the diffusibility of a drug through the sides of the root of a tooth I submit the following method: Destroy and remove the pulp from a tooth and fill the apex of the root with some substance that will seal it hermetically. Introduce on cotton or silk some 95 per cent carbolic acid. Seal this carefully into the root with oxyphosphate of zinc; leave it therein twenty-four or forty-eight hours, then extract the tooth, carefully wash the exterior of the root with distilled water and preserve this. Now suspend the root of the tooth in bromin water and you will soon find that it has not been permeated with carbolic acid when in place in the jaw. (Take the bloody water that you have preserved in washing the exterior of the root, add one-tenth in volume of hydrogen peroxid to decolorize the red blood corpuscles. Filter this, and test it for carbolic acid by the bromin water test. If you do not get the reaction the experiment has been a success as showing that carbolic acid does not pass through the sides of a root, dentin, cementum and peridental membrane when the tooth is implanted in the jaw.) Repeat this experiment with a 20 per cent silver nitrate solution and the results are always *nil*. (Scheumdige test for nitrates, 1 to 87,000.)

In order to further demonstrate the fact that coagulating agents do not pass through or diffuse themselves through a coagulum, you

can use pure wood creosote and you will get the same result. (As creosote is only sparingly soluble in water 1 to 80, you can appreciate this, although it is a good coagulator of albumen.) It is likewise futile to expect an agent such as zinc chlorid to pass through its own coagulum when its affinity for water has been satisfied. Corrosive sublimate precipitates its own coagulum, through which it does not pass. (Egg albumen being the normal antidote for poisoning by corrosive sublimate.) Trichloracetic acid (Saltus test, 1 to 7,891) in solution of 20 per cent was found useless as a diffusible agent through dentin, cementum and peridental membrane. All of the certain precipitators of albumen fail to penetrate their own coagulum and the tissues of the tooth. I have not contended that a tooth hollowed out by caries and mechanical agencies contained enough of the glue-yielding substance to form a perfect coagulum, but I have contended and do contend that if a putrescent tooth pulp is removed from a tooth, and powerful coagulating agents are introduced, if there were a need for disinfection the object is defeated, as the agent produces a coagulum which is a barrier to the diffusion of drugs like carbolic acid, bichlorid of mercury, creosote, chlorid of zinc and silver nitrate.

I am glad that a better knowledge of drugs is being slowly diffused through what I am pleased to term the mind of the laity of the profession, as it was absolutely necessary for us to pull away from the traditions of the supposed value of disinfecting agents. It would matter little if all coagulating drugs did pass through the dentin and cementum if they were equally effective as disinfectants with those that have no coagulating properties, but they are not. If you will look at the lists and tables proposed by Miller, Sternberg, Macfarland, Senn, Bowhill and others you will see that such substances as carbolic acid, zinc chlorid, creosote and absolute alcohol are feeble compared with even peppermint, turpentine water or chloroform water. In the disinfection of pulpless teeth the first necessity is to render the canals surgically clean with substances that are soluble in water. Water is the great menstruum, and if any mephitic gases are present they must be washed out or displaced. How absurd it would be to ask any one at this day to wash the root canal with 95 per cent carbolic acid, or pure wood creosote, or a 50 per cent solution of chlorid of zinc, without first using an aqueous solution of some drug that would displace the gases and dissolve or

destroy the putrid matter. It is far better and safer and more scientific to use a one to two thousand bichlorid solution slightly acidulated, or a 5 per cent boro-glycerin solution, or a one-half of one per cent solution of dried sodium carbonate, or even hydrogen dioxid, than any of the above mentioned powerful coagulators of albumen.

I desire to impress upon you the fact that to disinfect is to cleanse, to wash out, to displace poisonous matters, not to cook, and paint over, and seal them in the dentin of the tooth, unless they may come under the head of agents that will redissolve their own coagulum, because the power to concrete or coagulate as soon as the affinity of the coagulant for water is satisfied is not added to, but it becomes feebler and feebler until the coagulum is not a protective to the territory it occupies or covers. How many of you have opened into a tooth that has been soaked and saturated with coagulating drugs, and found a stench that was not primary. The coagulum broke down, or the odors were imprisoned, not destroyed, and in time there was trouble. Avoid this. All surgery is aseptic even when surrounded by poisons and the poison-makers. In putrefaction these must be eliminated and present methods in modern dental surgery substituted where perfect asepsis is not possible; such poisons must be eliminated by dilution and in circumscribed places; poisons and poison-makers must not be semi-cooked and smothered, but must be burnt up, or cut out, or absolutely disinfected with substances of a noncoagulating nature, or those at least which will render them innocuous.—*Review.*

DENTAL CHEMISTRY. By W. H. Reaben, D.D.S., McComb, Miss. Read before the Mississippi Dental Association, 1902. The subject I shall present is of vast importance to the laity as well as to the profession; important to the layman because when he masters its secrets he will be able to combat the worst agency in the destruction of his masticating organs. The chemical disintegration of the teeth is the principal source of their destruction, and when we as dentists master its causes and prevent its ravages we shall have conferred a greater benefit to humanity in general than to our incomes.

The teeth are subject, of course, to other and highly important destructive influences, but none so serious as chemical solution. I shall not deal with mechanical abrasion, pyorrhea, or violence; but

speak of the chemical changes that take place in the mouth and teeth. The teeth are composed of calcium carbonate, calcium phosphate, magnesium phosphate, sodium salts, and animal matter. I shall not treat of the development of the tooth before its eruption, but will consider it as having reached its permanent position in the process. It is covered externally with enamel, an inert substance having almost invariably no animal matter in its composition or interspersed among its rods. Sometimes, however, some stray fibrillæ reach it and give it sensitiveness. For the most part it is entirely cut off at the completion of its formation from all sources of nutrition, and it is deprived of all defensive mechanism against agencies which may threaten its destruction, yet it is better able to hold its own against all sources of destruction than any of its underlying structures. The enamel can be regarded as only an inert chemical substance, the exact chemical morphology and composition of which are but imperfectly understood.

Enamel suffers from chemical solution both through the action of acids formed in the mouth during fermentative processes, and probably by morbid secretions of the glands, also through the action of acids present in foods or taken as medicinal agents. From the chemical composition of enamel it is at once evident that the essential cause of the loss of the structure must be an acid, as only acids can dissolve it. In erosion of the enamel it is evident that the cause is due to an acid of localized formation, because if of general distribution the lingual and occlusal faces of the teeth would be affected equally with the labial. It will be observed that the areas of erosion are in situations in which food débris, fermentable material, collects in least amount. The inquirer is of necessity driven to the belief that local acid secretion is the active cause. Secretion implies the existence of glandular tissue, and the only glands in close relationship with the labial faces of the teeth are the muciparous glands of the lip, mucus-forming glands called labial follicles.

The best cure for this affection is, according to my belief, a local treatment. Systemic treatment may be tried first; but in case that fails, the crowns of the affected teeth had best be removed once for all, for filling them with any material whatever does not stop this affection until the enamel has been completely renewed with some foreign, artificial substance. Excellent results in checking the progress of the decalcification are obtained from the use of magnesium

hydrate, milk of magnesia. It is deposited in a film over the surface of the teeth, making an alkaline coating. It should be used freely before retiring at night. If the patient cares to take the trouble, it is said to be an excellent practice to dry the labial surfaces of the teeth each evening and paint them with a solution of amber in chloroform.

Had we more time at this meeting I should treat further upon this subject of chemical erosion, but must say something of other and more commonly encountered agencies. Many stains are commonly found upon the enamel, but they are for the most part harmless. Salts of copper, iron, manganese, mercury, lead, nickel, and silver have been found by analysis to be present upon the teeth. Green stain is commonly found upon the labial surfaces of the permanent teeth of young persons. This stain is thought to be a source of decay, and it is a very natural conclusion, since the stain is usually followed if not accompanied by decay. If the deposits are subjected to friction with abrasives they disappear slowly, and the enamel beneath is found roughened. This is what has led to the belief that these deposits cause decalcification of the enamel. It is found upon adult teeth that when an area of cervico-labial enamel has become roughened through slight decalcification green stain is likely to form upon the rough surface if proper hygienic care is not exercised. It is also found that if the stain be removed by proper abrasives, the roughened enamel may be readily polished—*i. e.,* the decalcification is very superficial.

According to Burchard, this coloring matter is found to be insoluble in water, glycerin, alcohol, ether, chloroform, and oil of turpentin. Mineral acids act but slowly upon it, but chlorin and nascent oxygen destroy it rapidly. Some believe the green stain to be of vegetable origin, but this is disproved by the fact that it is not soluble in ether, which is a solvent of chlorophyll, the green coloring matter of plants. These stains can be removed chemically. Copper, nickel, and iron stains can be treated by continued washings with chlorin water; silver the same, to be acted upon by tincture of iodin, forming soluble iodid, and so on, but as all of these deposits, including green stain, are very superficial, the rational course of treatment is their mechanical removal by means of abrasives.

Having treated lightly upon the above, we come now to the consideration of the most serious foe to the teeth, caries, which is the solution of the calcium basis of enamel and dentin. The relation

of dentin to the odontoblasts is that of a formed product. So far as disease processes are concerned, the formed material plays a passive part. Disorders which involve constructive changes in the dentin can be associated only with its vital parts, which are the dentinal filaments, prolongations of the peripheral cells of the pulp. It follows, therefore, that all nutritional changes which occur in the dentin are directly the result of a physiological or pathological process in the pulp; and associated disease conditions are not diseases of the dentin, strictly speaking, but are diseases of the pulp.

I shall speak of the destructive diseases of the dentin which are due primarily to chemical action. It appears that the process of erosion of the dentin is much slower than its progress in enamel. This is probably due to the fact that enamel is more thoroughly mineral matter, and is therefore more readily soluble in the peculiar acid which erodes enamel. Vitality of the pulp has little to do with this form of solution. In fact, pulp vitality plays very little part in retarding any form of destructive influence.

As I said above, caries may be defined as a progressive molecular destruction of the calcic tissues of the teeth, the first stage of which is, according to Burchard, a solution of the calcium salts by lactic acid; the second, the dissolution of the organic matrix through the agency of saprophytic fungi.

In 1835 Robertson of Birmingham, England, advanced the opinion, based upon his observations, that it is to chemical and not to inflammatory action that the destruction of the teeth must be attributed. He stated that "particles of food retained in fissures of the teeth and in spaces between the teeth undergo a process of decomposition and acquire the property of corroding, disuniting, and therefore destroying the earthy and animal substance of which the teeth are composed."

John Tomes, a little later, was the first to record microscopic examinations of carious dentin. He described the transparent zone line between the carious dentin. He announced that if blue litmus paper be applied to a carious cavity it is at once reddened, "which furnishes evidence of an agent capable, if unresisted by the vitality of the dentin, of depriving the tissue of its earthy constituents, leaving the gelatin to undergo a gradual decomposition, favored by the heat and moisture of the mouth."

Later observers, however, do not agree with him that the vitality

offers any resistance to the ravages of decay. The electro-chemical theory of Bridgeman was next advanced. Miller examined his assumptions and reported a long series of experiments relative thereto.

Before 1868 Dr. George Watt had advanced the mineral-acid theory—that decay is caused by the action of mineral acids generated in the mouth upon the calcic tissues of the teeth. He ascribed the origin of sulphuric acid to be from H_2S generated in putrefactive processes. It is acted upon by oxygen; sulphur is set free, which in a nascent state combines with oxygen, forming sulphur dioxid, which in the presence of watery saliva becomes H_2SO_4. Hydrochloric acid, he said, may be free in the mouth, or may result from the decomposition of chlorids. Chlorin is set free, which, combining with hydrogen, forms HCl. Nitric acid was held to be formed from the ammonia produced in the process of organic decomposition. Decomposed by the action of oxygen, nitrogen oxids are formed, one of them being nitric acid.

In 1882 Dr. W. D. Miller of Berlin announced as the results of experiments conducted by him that he believed the first stage of dental caries to consist of the decalcification of the tissues of the teeth by acids which are for the greater part generated in the mouth by fermentation. Miller's experiments carry conviction with them. *Experiments:* 1. Fresh saliva mixed with starch (1:40), and kept at a blood temperature invariably becomes acid in from four to five hours. 2. A glass tube two centimeters long and three millimeters wide was filled with starch and fastened to a molar tooth on going to bed. The next morning the contents of the tube had a strong acid reaction. 3. When the mixture was heated for half an hour at 100° C., and placed in an incubator, it did not become acid in twenty-four hours. 4. When the starch alone was heated to 150° before mixing, the solution became sour; hence the ferment exists in the saliva and not in the starch. 5. Carbolic acid was added to saliva and starch mixture to one-half per cent strength and put in an incubator. When tested in a few hours no acid was found, but sugar was in solution. 6. A mixture of saliva and grape sugar was subjected to a temperature of 67° C. for twenty minutes, and placed in an incubator for twenty hours. The solution became acid; hence the fermentation was caused by an organized ferment. 7. Several drops of a solution of starch and saliva (1:40) were put in each of several sterilized test tubes and sterilized. One tube was used as a

control. One tube was infected with carious dentin. In twenty hours the solution was acid. From this tube a second tube was infected; from a second a third, and so on, each becoming acid—*i. e.*, an organized and reproductive ferment, producing acid, was contained in deep layers of carious dentin. Other experiments demonstrated the fungus to be independent of the free access of oxygen for its development.

By elabrate experiments Miller clearly determines the presence of lactic acid in carious dentin. He holds that this acid is produced by infecting organisms. The fungi have the power of inducing hydration of nonfermentable cane sugar, converting it into fermentable levulose and dextrose:

Cane Sugar. Levulose. Dextrose.

$$C_{12}H_{22}O_{11}+H_2O=C_6H_{12}O_6+C_6H_{12}O_6$$

Miller summarizes as follows: "Whenever solutions of sugar (nearly always present in the human mouth) stagnate in fissures between the teeth, etc., they *must* become acid. The acids, gaining access to the dentin, take up the solutions of sugar and organisms which develop independent of the access of air. Flourishing, they produce lactic acid within the tubules. As each layer of dentin becomes softened in time, the microorganisms *follow after,* continually producing new acid."

It is believed by many that changes in the resisting power of teeth take place within the tooth itself, and perhaps with foundation; for teeth that appear prone to decay in spite of constant care, suddenly cease to decay, or at most decay very slowly. And on the other hand, teeth that have been sound for thirty years or more suddenly fall victims to caries. It does not follow of necessity from this that the resisting or non-resisting power of the teeth is changed. It cannot be. Observation proves to us that the tooth, once formed, is not subject to any change from within which would vary the proportion of its constituents. The pulp may become larger and gradually absorb the dentin, but the fibrillæ never resorb anything deposited by them. If they did, how about the enamel? It is beyond possibility of influence from within the tooth.

It may be argued that children's teeth decay very rapidly; but these same teeth, if preserved until maturity, will show no tendency to decay in new places. That does not prove that the teeth have hardened or have become more resistant, but that the conditions

which formed the acids and invited microorganisms have been changed.

We observe that mothers, who before giving birth to a child had faultless teeth, begin to suffer a loss of tooth substance. That does not prove that a change has taken place within the tooth structure, diminishing its resisting power. It has been stated and maintained that during gestation there is a lessening of the calcium salts of the teeth, the reason being that calcium salts are robbed from the tissues of the mother to supply the tissues of the fetus, and that the dentin suffers as do the bones of the body. The enamel, being a nonvital tissue, of course *could not* be affected, although even decalcification of this tissue has been held to occur.

Now, as it is never maintained that the matrix itself loses its form, it is evident that the cells must then cause resorption through the dentin substances. A solvent must be formed capable of abstracting the calcium salts from the dentin, and capable of acting through the transformed matrix. The mode of formation and character of its nutrition are in themselves sufficient to set aside such a hypothesis as the above. Another proof of the fallacy of the belief is that pulpless teeth break down rapidly during the caries of pregnancy, thus proving that the amount of calcium salts in the tissues could not be a factor. The causes are, therefore, due to a change in the fluids of the mouth.

When decay that it seems impossible to stop for years ceases, and one enjoys an immunity from caries, it is due, as has been shown, to a diminution or entire removal of acids and other external causes of decay, and not to the increased resistance of the tooth substance. And, as above stated, when teeth that have been immune from decay for years suddenly begin to suffer, it is *not* due to any increase in the nonresistance of the tooth substance, but to an increase in the chemical agents that produce decay.—*Headlight.*

CARBONIZED COTTON AND ITS VARIOUS USES IN DENTAL PRACTICE. By A. Jessel, D.D.S., Stockholm, Sweden. Read before the American Dental Society of Europe, August, 1902. Carbonized cotton has stood the test of about twenty years of private practice. It has, moreover, been used at the Dental Hospital and clinics in Sweden, as well as in other parts of Europe, for many years, and has proved itself to be a material "par excellence." Arti-

cles on its uses have appeared in various dental journals both in America and Europe, but it seems that the subject has not attracted sufficient attention, as is evident from the following brief extract from an article on the "Treatment of Pulpless Teeth." It runs thus: "Mix powdered charcoal into a paste with creosote; with a broach carry the medicament into the canals. If care is observed the dressing can be carried to the apex without difficulty. With this treatment aching teeth have been permanently soothed where many other remedies have failed."

It was on seeing this article that I determined to write a short paper on the various dental uses of carbonized cotton, showing at the same time the advantages this material has over others now in use for the treatment of exposed and aching pulps, for gangrenous pulps and their complications, as a vehicle for carrying medicaments in devitalizing and treating teeth, as a hemostatic after extraction, and last, but not least, in the permanent filling of root canals of all teeth, both temporary and permanent. I am sure that had the writer of that article read Dr. Elof Förberg's paper on "Carbonized Cotton" in the *American Dental Weekly*, May, 1898, he would readily see what an advantage it has over ordinary charcoal such as he uses. It is to Dr. Förberg that the credit of introducing carbonized cotton into dental practice is due.

As its simple name implies, it is cotton which, by a certain method of treatment, has been reduced to a state of carbon. But it differs in many respects from the ordinary forms of carbon, and especially charcoal, in that it is naturally far more pliable and finely divided, while at the same time it has a fiber. Owing to its extreme fineness and its being considerably more porous, it is therefore far superior to charcoal as an absorbent of liquids and gases. It may at first appear that this material is difficult to manipulate, because when dry it very readily crumbles between your fingers and is reduced to a fine powder. This, however, is easily prevented by simply moistening the cotton with alcohol, which can afterwards be very rapidly evaporated. To the alcohol may furthermore be added any other desirable antiseptic. A good quality of pure absorbent cotton with a fine fiber is selected. This is first saturated with boracic acid and then placed in an air-tight iron retort. The retort is then slowly heated up to almost white heat, whereby the cotton is gradually reduced to carbon. The material thus produced will no longer burn,

and this is a quality which materially enhances its value as an agent in the treatment of teeth and as a dressing, or for wounds after extraction. Wherever we can it is our duty to work aseptically. Carbonized cotton can be held over the flame of a Bunsen burner or an alcohol lamp and thoroughly sterilized. Its fibers undergo no change whatever. On the contrary, its value as an absorbing agent is thereby greatly increased, and it is remarkable with what rapidity it will absorb any medicament with which only a very few of its fibers may come in contact.

Carbonized cotton is an excellent material for allaying odontalgia due to an exposed or vitiated pulp. It is so extremely soft and non-irritating that it can be placed with impunity over an exposed pulp. You can use any of your favorite obtundents in connection with it. Dip a little of the well-condensed cotton into the medicine, place it carefully over the offending pulp, and carefully seal the cavity with a temporary stopping. In like manner it can be used as a pulp capping in all cases where the walls of the cavity are not so thin as to allow the black cotton to show through. Like all carbon it is a poor conductor of heat and electricity, a thing to consider in pulp capping.

As a carrier for arsenic in devitalizing pulps it is very useful on account of the ease with which the paste can be applied precisely on the spot required, and the absence of any pressure or irritation resulting from it. In using it for this purpose my method is to saturate a small portion of the carbonized cotton with any suitable antiseptic, such as carbolic acid and oil of cloves equal parts, and remove the excess of fluid with spunk or bibulous paper, so as to have the cotton just moist. I then take up a small quantity of the paste on a spatula, place on the carbonized cotton as I hold it between the points of my pliers, and carefully carry it home. The cotton being so very light and moist is almost drawn to place by capillary attraction, so to speak. Another moist piece larger than the former is then placed over the first piece, and the cavity hermetically sealed. I have never had any pain resulting on account of undue pressure upon an exposed pulp when applied in this way.

As a hemostatic after extraction, as well as for treating other lesions of the mouth, it gives most satisfactory results. Its advantages here over the ordinary cotton are very marked indeed. In

the first place, we are always sure of a perfectly aseptic dressing. Secondly, it is capable of absorbing a far greater amount of antiseptics or blood-coagulating remedies, and, thirdly, it is a hemostatic in itself. Its pliability allows it to be placed in the socket of an extracted tooth without causing the slightest pain or inconvenience to the patient. While the ordinary cotton soon decomposes and becomes offensive, the carbonized cotton, by reason of its absorbent, deodorizing qualities, remains sweet a much longer time. It is a well-known fact that the removal of a cotton tampon from the socket of a tooth very often causes secondary hemorrhage. The carbonized cotton, on the contrary, does not irritate the tissues in the least, if only ordinary care is used in its removal. This is greatly facilitated by syringing the wound with a warm antiseptic solution and using wide-beaked dressing pliers to remove the larger portion of the material. When this is carefully done the wound will be sweet and clean and show no signs of recurring hemorrhage.

I usually use a 3 per cent solution of peroxid of hydrogen, together with the carbonized cotton, and have in this way checked some of the most obstinate cases of bleeding. The rapid evolution of oxygen which takes place when the peroxid comes in contact with the blood has a tendency to eject the soft cotton from the socket. This, however, is readily prevented by applying a small mouth napkin or the like over the wound, or simply by holding your finger over the dressing until the frothing ceases. The use of digital pressure is, by the way, a most effective way of stopping hemorrhage. The patient can be dismissed in a few moments, with instructions to return the following day to have the dressing removed and the wound syringed.

Having now spoken of some of the minor uses of carbonized cotton, I come to that difficult and much-abused operation—the treatment of pulpless and putrescent teeth, and the proper filling of root canals. It is here that all of the many excellent qualities of carbonized cotton are brought into full play and the most gratifying results obtained. I know that the ground upon which I am about to trespass is a much debated one. So many new methods have been recommended that at present our stock of materials is very large. It is not my wish to add a new material—for the truth is that it is not at all new, but is old and tried, and the fact that it is not more widely known is no fault of the agent itself. I want to show simply what

advantages the carbonized cotton has over the other materials now so generally in use and so well spoken of in our text-books.

I think most writers agree that a material suitable for the filling of root canals ought to possess the following properties: 1. Adaptability and ease of manipulation, so as to insure a perfect filling, even in cases of very minute and crooked canals. 2. It must be unchanged by surrounding influences. 3. Non-irritating to soft tissues. 4. Should be at least aseptic when applied, and preferably antiseptic. 5. Impermeability, thus perfectly sealing the apical foramen. To these we may also add the property of absorbing gases, which in spite of all treatment will sometimes develop in the canals, and the capability of being easily removed in case it should become necessary.

The materials generally used and recommended for the filling of root canals do not, in my opinion, fulfill all these requirements. Gold can certainly be made aseptic, and is unaltered by surrounding conditions—but its introduction into small curved canals is very difficult, if not entirely impossible. Shredded tin, copper and lead points are open to the same objection. Wood and gutta-percha points are not aseptic, are porous, and soon decompose, giving rise to noxious gases. Gutta-percha points are, moreover, very apt to be forced too far, and some of the soft material may be pressed through the apical foramen. The cements are all more or less irritating to the periapical tissue, and are not stable. A very common experience on opening canals which have been filled for some years with cement is to find them entirely or partly empty, and in a more or less septic condition, as evinced by the foul odor emanating from them. Cotton combined with a variety of antiseptics has been much used and praised by some, while others again have unmercifully condemned it, so that at present its place as a root-canal filling is rather uncertain. Thus it seems that our supply of root-filling materials is still very incomplete in the light of the many objections which can be raised against nearly all of them.

After having experimented many years to modify the ordinary cotton so as to make it insoluble and non-decomposing, Dr. Förberg finally found in the carbonized cotton exactly what he was seeking. At first its black color and its brittleness seemed to stand in the way of its usefulness as a root filling, but these factors were soon reduced to a minimum or almost nil by following certain methods of

procedure. The brittleness is entirely removed as soon as the material becomes moist, hence the addition of a fluid antiseptic serves a two-fold purpose. We have then a material which is not only aseptic, but also antiseptic. Indeed, the dry carbonized cotton is in itself an antiseptic, owing to the presence of anhydrous boracic acid with which its fibers are impregnated. It does not irritate the periapical tissue in the least. I have often, when treating abscesses with fistulous openings, forced some of the material entirely through the tract without causing any pain or inconvenience. Of course, the material in this case was very finely divided.

Owing to its extreme softness, and I might almost say plasticity, it can be forced into the finest canals where even a broach cannot penetrate. Its value as an agent for filling tortuous canals becomes therefore self-evident. It does not clog nor obstruct the canal as ordinary cotton does. Should there possibly be any tendency on the part of the material to roll together and stick, the obstruction is immediately removed by forcing a fine smooth broach through the mass, whereby the cotton is partly pulverized. Carbonized cotton does not decompose nor dissolve out of the canals. A root once filled with it, and the pulp chamber securely sealed, remains filled indefinitely. Its black color is no drawback if the precaution is observed to let the root filling extend no farther than the gum line, or rather not even reaching the gingival margin. It causes no discoloration in the tooth itself; on the contrary, it tends to preserve its natural shade by absorbing any gases or fluids which *may* develop after the treatment is completed.

The treatment of gangrenous or abscessed teeth becomes rather a pleasure than otherwise when working with carbonized cotton. I remember very distinctly my first experience with this peculiar material. I had been treating a gangrenous upper second molar in a boy of about fourteen. The root canals were extremely wide and long, and there was a mass of decomposed and foul-smelling pulp tissue in all three canals. I cleansed them mechanically as thoroughly as I could, and used sulphuric acid repeatedly, each time sealing in some of the acid on a bit of ordinary cotton. This treatment was continued daily, but every time the cotton was removed there was the same disagreeable, foul odor. One day, after having treated the case about five or six times, at Dr. Förberg's suggestion I used carbonized cotton, and next day I saw my patient again, and

was quite surprised at the lack of any odor other than that of the sulphuric acid and ether I was using. It has stood by me in my hardest struggles against abscessed teeth, and even buccal fistula, and has proved to be of the greatest value.

I wish in passing to say just a word in regard to the sulphuric-ether preparation for the treatment of putrescent teeth and for enlarged or constricted canals. We are familiar with the Callahan method and the good results following it, but in our practice we have obtained even better results from the preparation which Dr. Herbst recommends for obtunding sensitive dentin. This is prepared in the following way—a small portion of C. P. concentrated sulphuric acid is put into a glass vial, and to this is added sulphuric ether, stirring constantly with a glass rod until the acid is saturated. This is easily ascertained, for the excess of ether floats on the surface of the acid as a lighter-colored liquid. This superfluous ether is then allowed to evaporate. Dr. Herbst also adds a few crystals of hydrochlorate of cocain, and I find the addition very favorable, acting as an obtundent. This chemical compound has great penetrating properties, and it is this, together with the fact that it can be quickly evaporated with warm air when desirable, which makes it so much more valuable than the sulphuric acid alone, such as Dr. Callahan uses. Its action, moreover, seems to be less irritating than the above. I shall not dwell on the method of employing this preparation, as that does not differ from Dr. Callahan's, with the exception, of course, that I use the carbonized instead of the plain cotton, and thus get the full action of the acid; while in Callahan's method much is absorbed and destroyed by the cotton which, unlike the carbon, is not inert.

The removal of the old carbonized cotton at each sitting is readily accomplished. A fine barbed broach is used to loosen up the mass, or a small-sized root-canal drill in the engine may be employed. A jet of water from a fine-pointed syringe passed up into the canal quickly removes the cotton, the whole operation being rapidly and easily done.

When the canals have been thoroughly treated and prepared as usual for a root filling, we are ready for the introduction of the carbonized cotton. A small quantity of the material is perfectly annealed, and we now have it aseptic. It is then dipped into any suitable antiseptic, or simply into alcohol to have it moist and facilitate

its manipulation. Where there has been a gangrenous pulp a 10 to 20 per cent solution of formalin with eugenol is preferable. With long, narrow-beaked dressing pliers a small portion of the cotton is carried up into the root canals and to the apex by means of a smooth, square-pointed root-canal plugger or jeweler's broach, the length of the canal having been previously marked on the same. A slight zig-zag motion prevents the instrument from slipping past the cotton. Always use as large a broach as the portion of the canal under treatment will permit. Approaching nearer the pulp chamber, large pieces of cotton and a coarser broach are used. Each piece is carefully condensed, being mindful, however, not to use too much pressure while working near the apex. As soon as the canals are flush the whole mass is thoroughly pressed together with a piece of spunk. Any surplus is removed, and the cavity in the crown carefully washed out with alcohol and cotton, or bibulous paper. The filling is again condensed with spunk, and finally dried with hot air. It will be evident that the drier the carbonized cotton is when finally in place, the greater will be its value as a gas or fluid-absorbing medium. The final filling, be that gold, amalgam, cement, porcelain or any other, can be placed directly upon this root filling, still I prefer filling the pulp chamber or end of canal independently, and think that for this purpose gutta-percha answers best.

I have had several cases come to me from other dentists where the canal has been perforated at some point, and the tooth has consequently given trouble. In such cases the carbonized cotton has always come to the rescue. I then use a milder antiseptic, such as nitrate of silver, or chinosol, which of late is being considerably used in dental practice. I use this as a powder incorporated with glycerin and alcohol, and saturate the carbonized cotton with it. If care is exercised not to use any pressure over the perforation the tooth will return to its normal state of quietude, and the patient experience no further trouble.

As a mummifying agent the carbonized cotton and formalin 20 per cent solution work beautifully; any small portions of pulp tissue which may be out of reach of either root-canal drill or broach will be rendered entirely harmless. Carbonized cotton also makes an excellent root filling for the temporary teeth. Its softness and non-irritating qualities especially adapt it for this class of work. It should be placed very lightly into the canals, so as to cause no

pressure to the periapical tissue. The use of strong antiseptics should, moreover, be avoided. In cases of re- and implantation, the carbonized cotton filling in the canal will cause no irritation whatever, and the tooth therefore will have more likelihood of being retained longer.—*Review.*

NON-ERUPTION OF TEETH. By Stewart Leroy McCurdy, M.D., Pittsburg. Occasionally teeth fail to erupt from some fault of the development of the tooth germ. The process of building may be in the wrong direction, and the tooth grow upwards or to one side, or some obstruction may interfere with the normal eruption, and instead of the crown pushing its way through the alveolus it grows in an opposite direction.

A very frequent mistake of the general surgeon, who is on the lookout for sarcoma, exostoma, etc., and seldom sees a dentigerous cyst or a tumor due to non-eruption, is to mistake the graver condition for the latter. In this event he makes a complete removal of a maxilla or half of the mandible. After the operation is completed and the tumor is incised, a tooth is found in the center. Had the true condition been suspected it could have been removed, and such abnormal processes of the bone as were found chiseled away, the cavity curetted, packed with gauze, and in a few weeks repair would have followed without deformity or destruction of functional usefulness of the parts. It is always advisable in bone tumors about the face to pass an awl or drill through them before operation is begun, to exclude a possible dentigerous cyst. Instances of this nature have been observed by the writer and many cases are recorded.

Discharging sinuses from the maxilla or mandible are not always evidence of disease of the antrum or other sinuses or of osteomyelitis or tubercular bone disease. These sinuses are not infrequently the result of a non-erupted tooth. Indeed all sinuses giving a chronic history, associated with slight or possibly no pain when this sinus is open, extending over a period of years, are more likely to be caused by non-eruption than destructive bone disease.

Case I.—Mrs. A. T., aged 49, had suffered with pain in the right maxilla, just external to the alea, for nineteen years. There never had been any discharge during sixteen years, when a small opening which discharged small quantities of pus and serum was discovered internal to the second incisor. This had remained open for three

years, but occasionally it would close, to be followed by pain which continued until spontaneous eruption would relieve the suffering. An effort to determine whether it was a case of necrosis or non-eruption resulted in a decision in favor of the latter, for the following reasons: 1st. In necrosis a greater amount of tissue would have been involved. 2nd. The character of the discharge would have been pus at all times, usually of an offensive odor. 3rd. The patient was uncertain as to the eruption or extraction of the second incisor. 4th. In osteomyelitis or tubercular bone disease a sinus would have formed long before it appeared in this case. 5th. Associated symptoms, as swelling, involvement of secondary structures, as the antrum, would have resulted, none of which was ever present. 6th. The general health of the patient would have been impaired.

An operation under A. C. E. anesthesia consisted in enlarging the opening in the mucous membrane along the line of the alveolus. As the sinus in the bone was slightly back of the alveolus, the bone was cut inward with a chisel. After excavating the opening sufficiently to admit a pair of bone forceps, they were entered with some difficulty, and a tooth was dislodged from its abnormal location. The depth of the cavity thus left after the removal of the tooth was two inches, as determined by actual measurement. The subsequent history showed that no foreign substance had been allowed to remain, and the sinus was entirely closed in a week, and has remained so and free from pain for four years.

Case II.—An interesting case of non-eruption was recently under my care. There was a history of discharging sinuses from the superior maxillary continuously for eight years, beginning when the patient was twelve years old. There was one sinus between the cuspid and bicuspid on the right side, about one-half an inch above the gingival line, from which a small quantity of pus escaped. The principal discharge came from about the molar teeth on both sides. It could be forced out by pressing a finger against the bone back of the molar and drawing the finger forward, when the pus came away in a stream. It was very offensive. There was pretty much the same discharge from both sides, but the quantity was greater from the left. He had had treatment from dentists and doctors during all these years, but no radical operation had been performed until October, 1897, when a surgeon, concluding that it was antral disease, enlarged the sinus which terminated between the cuspid

and bicuspid on the right side, extending the opening upward and backward, and possibly into the right antrum, and the subsequent treatment was for abscess of this cavity. Nothing was done toward exploring the pus canals about the molar teeth.

Early in January, 1898, another operation similar to the first was performed by the same surgeon. January 19, 1898, the case presented conditions as above described. It was found that there was considerable tumefaction extending perpendicularly just internal to the opening made during the operation. Upon further inquiry it was learned that the right cuspid had never erupted. It was concluded that the tooth was the cause of the trouble. Another enlargement was found on the left side of the inferior maxillary, over the roots of the bicuspids. Here the patient claimed the second bicuspid had never erupted; he also claimed that he had not had eight of his permanent teeth. Operation was, of course, advised, and January 19, 1898, the following conditions were found: A perfectly developed superior cuspid was found, which the former operations had failed to locate. This operation practically cured the trouble at this point, but it did not, however, benefit or diminish the flow of offensive pus from about the molar teeth. A second operation was advised, which was done February 8. At this time the second molar teeth were extracted (the third never having erupted), and free openings were made into the pus cavities which were found extending to the temporal fossa of the malar bones. On the left the cavity admitted the writer's little finger for two inches and on the left side one and one-half inch. These sinuses were thoroughly curetted. No denuded bone was to be found. The sinuses were packed with gauze. The left lower bicuspid was extracted. Its root was found to be ankylosed to the process, and a small portion came away with the tooth. The process was further chiseled away, the idea being to remove the non-erupted tooth if possible, or at least to remove sufficient of the process to permit eruption. The left lower bicuspid erupted and the enlargement disappeared. The patient writes that he is entirely well and in perfect health. A recent photograph shows the sinuses, which, while open, are conical in shape and no food accumulates in them and there is no discharge.

Case III.—Miss B., aged 20, had been suffering pain in the region of the superior molars since her twelfth year. She knew that her second molars had not erupted, and was of the opinion that they

had something to do with her suffering. This appeared to be quite possible. Operation was advised, and under chloroform an incision was made from the first molar backward along the crest of the alveolus. The incision was extended down to the bone. The soft tissues, including periosteum and mucous membrane, were dissected back from the alveolar ridge so as to permit freedom in further operation. The tooth was found partially covered with bone. This was chiseled away and the tooth was pried from its position with a bone elevator. The crown of the tooth pointed directly forward, resting against the first molar. The roots projected slightly downward parallel with the long axis of the alveolus. The operation on the other side was exactly the same, the tooth was found in the same position. The flaps were adjusted and secured with catgut sutures. Repair followed without complication. The case is unusual because of the bilateral condition, the teeth on either side being in the same position.—*Summary.*

LIMITED NECROSIS FOLLOWING EXTRACTION. By Otto E. Inglis, D.D.S., Philadelphia. It not infrequently happens that after extraction there occur necrosis of the gum-margins and sloughing of the same, and also a necrotic condition of the alveolar walls, either associated with the sloughing or as a distinct condition. In so far as observed in ordinary cases these are due to (1) the use of local anesthetics; (2) to the bruising of the gum-margins in extraction; (3) to the bruising of the periosteal lining of the alveolar walls in extraction; (4) to the packing of tampons into the alveoli for an undue length of time, and (5) to the insufficiency of the blood-clot. These are primary causes, which lower the nutrition and recuperative vitality of the inner alveolar periosteum and permit the invasion of microorganisms.

In the case of the gum-margin moist gangrene occurs, the adjacent gum is inflamed, and the part is exceedingly painful and has a bad odor. Reflex pains are not uncommon. The treatment consists of sterilizing the mouth and cutting away the sloughing gum-tissue. A mouth wash or spray of hydrogen dioxid used frequently and persistently for several days thereafter will usually complete a cure, though the patient should be seen daily and any dead tissue curetted away, until healthy granulations are seen. The pain may be alleviated by the free use of the distillate of hamamelis, to which

may be added potassium chlorate to make a strength of twenty grains to the fluid ounce, or the formula recommended by Boenning may be used: Potassium chlorate, 2 drams; extract of hamamelis, 4 fluid ounces. Mix.—A teaspoonful to half a glass of water three times a day as a mouth wash.

If the bone be involved, as is usually the case when laceration has resulted from the effort to extract roots, it is found exposed and infected; the medullary tissue and bone-cells are inflamed and an osteitis exists. After disinfection of the mouth the exposed bone should have a strong solution of cocain held against it for a few minutes, and it should then be freely cut away until healthy bone-tissue is reached at a point below the inflamed gum level about the alveolus. A clot should if possible be induced to form over the bone after thorough removal of all debris and local disinfection, in order that a scaffold may be afforded the granulation tissue springing from the bone surface and gum-margins. If the mouth is kept sterile this does not become unduly infected, and healing proceeds rapidly. The same treatment for pain may be employed, or equal parts of phenol sodique and tincture of opium may be applied frequently from the finger-tip of the patient or a cotton pledget in tweezers, and is sedative and antiseptic. The alveolus may be found open, *i. e.*, free of clot, and instead of granulating alveolar walls there are found exposed hard infected malodorous bony parietes. This may persist for some time, and if neglected may produce necrosis of bone, requiring an operation of some importance.

The condition is readily cured, sometimes at one sitting, in the following manner: After mouth sterilization the alveolus is to be disinfected with a strong potassium permanganate or mercuric chlorid solution upon cotton tampons. A large sharp round sterile bur of about No. 8 size is to be used to cut away the alveolar wall to a depth sufficient to ensure a surface capable of healthy regeneration. This is evidenced by the sensation of pain produced by the bur. Upon elicitation of this sensation the bur is moved to another part. When the inner surface is thus freshened the debris is washed out of the alveolus and a clot is permitted to form. If this be not firm the patient is to be instructed not to violently rinse the mouth with the antiseptic, but nevertheless to use it frequently in a passive way. The following day the patient is seen, and any bare spots are again touched with the bur and a clot again induced. It has occurred

with the writer that a case of several days' standing of painful character has been promptly relieved by this simple means.

The rationale of the process is the purely surgical one of removing a cause and inducing aseptic granulation. The writer wishes to emphasize the value of the clot in these cases. After extraction of a tooth the filling of the alveolus with the clot is in normal course, and unless it becomes infected it apparently offers no barrier to perfect healing of the wound, although it is gradually invaded upon all sides by granulation tissue and removed by the process of resorption. It is not contended that granulations will not fill up the alveolus in a gradual manner if the parts are kept clean, but this is the difficulty, for the alveolus being deep, food is apt to collect in it and its removal may be troublesome. The clot, if firm, fills the alveolus and obviates the difficulty.—*Stomatologist.*

THE MODERN AMALGAMS. By Garrett Newkirk, D.D.S., Los Angeles, Cal. Read before the First District Dental Society of Illinois, at Rock Island, September 23-24, 1902. We all know how recent is our knowledge of the facts about amalgam for the filling of teeth, and that for whatever ideas of accuracy we possess we are indebted mostly to the careful investigations of one man, whose name is G. V. Black. We know, too, that the initial move in this work was suggested by a discussion which took place in our Illinois State Society, at Galesburg, about seven years ago.

Notwithstanding the fact that the amalgams had been serviceable in a large measure for half a century in the saving of teeth, it is a truth to be remembered that until very recently their characteristics were uncertain and apparently ungovernable. No one knew why one differed in its properties from another or why the same preparation or "make" disagreed with itself under varying conditions. But now, while all is not learned that perhaps may be, enough is known by intelligent makers to insure a degree of certainty and reliability for their products. We have now a confidence that is definite as to what we may do with them. If good results are wanting in the future the fault will be our own, dependent on bad manipulation. It is idle in this day to disparage and cry out against the use of amalgam. It has a field of its own and has come to stay. The man who knows where and how to use it can accomplish therewith a great amount of good.

Cases Adapted.—Cavities in any surface not conspicuous, where the patient is financially unable to bear the expense of gold, may be filled with amalgam. Teeth so badly broken down as to make the use of gold impracticable, and teeth that are often unwisely cut off and replaced with gold crowns, so long as there is a body of tooth substance sufficient for anchorage and support, may be built up and made for a long time serviceable with our improved amalgam. It is justifiable in some cases to use it in labial as well as buccal cavities of the lower teeth, also in lingual surfaces of the upper incisors.

The use of amalgam is justifiable not only in the interest of the patient, but to save the strength and nervous energy of the dentist himself. We have had noble men who courted an early death by the daily strain of difficult gold operations. Some are doing the same thing now, and they ought not to. No man has a right to imperil his life or health to carry out a theory of ideality with regard to disto-occlusal fillings in molars and bicuspids. He can find room enough for self-sacrifice without that. And it is a fact that unless a difficult gold filling is inserted with the greatest care, and without stint of nervous force on the part of the operator, it is worth less for the saving of the tooth than a good amalgam filling in the same situation. And it is a further fact that when the operator may be weary and suffering from overstrain, or when he cannot depend upon the self-control and steadiness of his patient, he simply *cannot* do his best with the difficult operation. In such cases uncertainties and deficiencies are sure to find place.

In the anterior teeth, with rare exceptions, the use of amalgam is certainly contraindicated. Gold, platinum-gold, porcelain, or the cements are demanded for esthetic reasons. Beyond that the rule becomes flexible. When conditions so combine as to favor gold, well and good. If operations can be borne by the patient without hardship, physical or pecuniary, and without undue strain upon the operator, well and good. There is satisfaction to both parties, and with the dentist a goodly share of commendable pride in the results achieved.

But the demand for gold is not imperative. Amalgam has license in this field. For certain purposes and in extreme cases our newer preparations fill a place that were otherwise empty. Broken-down roots may be restored often in preparation for gold crowns. Deep cavities extending rootward, cavities in roots denuded of their bony

covering may be filled well and quickly. Spaces may be bridged by extensive contours. The basal half of large cavities may be filled with alloy and the remainder with gold, the result of a combination being oftentimes better than could be had with either material alone.

Children's Teeth.—Our later non-shrinking amalgams are well adapted to the preservation of deciduous molars, and also of the first permanent molars. The oft-heard statement that "Amalgam cannot be depended upon in children's teeth" no longer holds good. Employed with the same degree of thoroughness that is necessary elsewhere, it becomes the *sine qua non* of this line of practice. One year ago a physician spoke to me about the teeth of his little daughter, three years old. He was quite distressed that all of her molars were badly decayed upon their occlusal surfaces and so sensitive that the child avoided using them. She was forming the habit of bolting her food and suffering from consequent indigestion. The occlusal faces of several were almost entirely broken down. It was evident that plastering them over with cement would be but a temporary makeshift. By patient effort, attempting but little at any one sitting, I was enabled to prepare those surfaces in a manner to hold amalgam. The oral condition has been comfortable ever since, and the fillings have not yet needed any addition or repair. The new amalgam has been of invaluable service to my young patients, and given more comfort of mind to me than any other one addition to our armament that I can think of, but it will not work for us unless we do our part. Next to gold it is high-toned and particular. It will tolerate no slight, either in handling or cavity preparation. Let no one suppose that he can use it in the same old easy way with which practitioners mixed and "stuck in" samples of the ancient sort.

Preparation of Cavities.—The essential principles and the general rules for the formation of cavities for amalgam are the same as for gold. If a builder were choosing a stone for the foundation of a pillar or an arch he would not take a round one, nor would he dig a round hole. He would know that the broader and more nearly flat the base the more reliable would be the support. So it is with the base of restoration—the new building, the addition to a tooth. The word "filling" is incomplete to express the true idea in this connection. We *rebuild,* as if we were restoring half a house or a broken monument, the new to join perfectly with the old, and strongly to bear the stress of storm and time. It would be well if we could quite

rid ourselves of such terms as "fillings" and "stoppings," which are little better than "*stuffing.*" It is restoration, reconstruction that we make, for that which has been broken away.

Nearly all students and many young practitioners have the idea—some are never able to rid themselves of it—that an overhanging wall or deep undercut is necessary to hold this building. They simply will not cut back, and *down, down,* to a good foundation, not if you stand over them "with a club." They fancy that the thing must be in some way propped up, which reminds me of the incident of an old farmer and his house. He had built a small house, much too high for its width, and under the persuasive influence of the gentle prairie zephyrs the house leaned to the rising sun, so the old gentleman propped the corners with some black oak poles, but these soon rotted, and he had to make a "lean-to" to brace up the main part. This is what we must do often—make a lean-to for the support of a toppling house. We can't depend on any sort of weak props, either black oak or shells of enamel.

I believe that a foundation properly shaped for a building with gold is good enough and just about right for amalgam. The margin may be beveled a little more for gold perhaps, but not much. The edges of the new amalgam stand well, especially in places where they are not subject to direct stress, and that is anywhere except on the occlusal surfaces.

Of course it would be idle to say that any filling will be a cube, but there is something in nearly all which suggests that form. Take, for example, a simple occlusal cavity in a molar tooth. There is first the base, then four walls, mesial, distal, lingual or palatal, buccal, five in all. The body of the filling then when complete is somewhat cubiform—five sides, determined by the cavity, form the sixth by the finish of its own occlusal surface. It follows then that the force of insertion, to secure perfect results, must be directed in five directions, viz., the base and each of the four lateral walls of the mould; and it follows that wherever a wall may be missing, as in every compound cavity, we must have a substitute therefor, mechanically applied. This substitute we denominate a matrix. I maintain that for amalgam filling (and we might include the cements as well if they were under consideration) in compound cavities the matrix is indispensable; and no student should be permitted to make such a

filling without it. The form, the mould, must be complete, except at the one open end of insertion.

What is the best matrix? That depends upon conditions present in any given case. Sometimes a very thin steel blade, with a handle (much like a "sickle" scaler) is available. This anyone should be able to make for himeslf. It can be made very thin and very tough by persistent beating with a hammer. It has the disadvantage of requiring the use of one hand, and if the patient moves his head the matrix is hard to keep in place. In many instances where a complete band matrix is admissable it is well to make one for the special case in hand; as, for example, where disto and mesio-occlusal cavities are connected.

The ordinary band matrix that one finds on the market is not the best. It is wrong in the principle of its construction. The most one can say of it is that it may be better than none. It is not adapted to the true restoration of tooth forms. It has the same fault as the gold bands which so many put over the crowns of live teeth, that inevitably must fail of contact at the necks of those teeth. The band matrix has also the disadvantage of requiring the next interproximate space for itself, where we do not want it at all, and where it is often difficult to insert. The ideal matrix is very thin, tough, flexible, adaptable to margins, easily inserted and removed, and occupies but one interproximate space. The one form of matrix and holder that in my experience meets every requirement in the large majority of cases is the Ivory. I would pay the cost of one many times over rather than be deprived of it. As a rule I do not believe in the use of a matrix for gold, but I repeat that it is indispensable for all compound fillings of amalgam.

Preparation and Insertion of Amalgam.—Unquestionably, the best way of mixing is by weight, in the proportion of seven grains of mercury to five of alloy. Practitioners of long experience obtain good results by the old-fashioned method of hand-mixing and pressure, there is no doubt of that, but if one is determined on the best results he must take the time and trouble to weigh the materials, and they must be thoroughly incorporated. Again, the older practitioner will do this quite well with finger and palm, but not so thoroughly as he could in a mortar. He often makes up in a way for his imperfect mixing by vigorous burnishing of the filling during its introduction.

*What Alloy?**—I shall not say that any special brand is better than all the others, but I *do think* that one should select a reliable make and stay with it. By learning the special working qualities of one preparation he acquires a skill of manipulation not possible to him who experiments with many.

We all know that there are cases where the use of the rubber dam is well nigh impracticable, but they are truly exceptional. The rule must be to *use the dam.* With this and the matrix in place, the alloy is made ready, we will suppose for a large compound cavity. It must be inserted as quickly as may be, but with thoroughness. Only a limited quantity should be inserted at first, one-fourth or perhaps one-third of the mass, and this condensed at the bottom and along the margins with an instrument that is not too large and coarse —one that may be applied directly at these points. The burnisher is *not* the instrument to use at this first stage of the filling; the end of the instrument should be square, not round. Unless hand pressure is very strong indeed I am convinced that better results are obtained by using the mallet. More material will be used for a given filling—it will have more weight and density. Before the first stage of filling is completed the material left has already hardened a little, and must be reworked briskly with thumb and finger or finger and palm till it becomes flexible, and from the warmth of the procedure glistening with an increase of mercury upon the surface. The second part of the mass may be inserted and burnished to place, or a larger flat-faced plugger may be used again with the mallet. By this time, with the cavity half or two-thirds filled, the remainder of the material may be too hard for use, unless one adds a slight amount of mercury and regrinds in the mortar, but this is not desirable. It is better to prepare a fresh mass without weighing, squeezing thoroughly through a strip of muslin. After this, if under the influence of a warm burnisher the surface seems to be too mercurial, an excess of fillings may be added to the last portion used.

When completed the ideal surface is very hard, and gives forth a

*Dr. Newkirk writes as follows to the DIGEST: "On looking over my paper, as published in the *American Dental Journal,* I notice that my reference to 'Fellowship' alloy *has been cut out.* I took pains to say that it was my favorite among them all. It seems to me poor policy in an editor, no matter what his commercial interest may be, to take such liberties with a manuscript. The effect is sure to be that of a boomerang. I did not say what I did to please anyone or to advertise anybody's product, but simply to express the truth."—Ed. DIGEST.

squeaky note under a smooth burnisher that amounts to a final certificate of character. Now let the surface have a "cotton" finish; a firm roll of cotton, cottonoid or lintene held by stiff pliers being the instrument. If the matrix has been of right form and adaptation, very slight trimming will be needed to restore practically the original form of the tooth. The pressure used in the introduction of the filling will have forced the teeth apart, at least to the extent of the thickness of the matrix. It is well that this should have an oiled surface to facilitate its easy removal, and the removal may take place at once by gentle manipulation when the filling has been completed.

Before removing the dam, caution the patient against quick or forcible closure of the mouth. See to it that no cusp of an occluding tooth strikes too sharply on the filling. Where the cusp is extra prominent it is sometimes better to grind away part of it, rather than hollow out the filling, notwithstanding the suspicion of the patient that the tooth may decay—at a point where it never does.

For removing any excess of filling at the point of occlusion I have never found another instrument quite so satisfactory as a small vulcanite scraper, No. 1, the reverse, convex side of which may often be used for a burnisher. The next step is to go carefully over the edges with a thin-bladed burnisher; then any overhanging flakes of amalgam should be removed with a knife-like blade, that will shave but not roughen the edges of the filling. *The contact point and the region round about it should remain untouched for an hour at least,* and only fine tape used for polishing the approximal surfaces; and again the contact point must be left alone, or only polished to conform with the adjacent contour. The occlusal surfaces having been smoothed with small cuttlefish disks, moosehide points and pumice, the operation is done, and so done that it will not reflect discredit on any operator, however humble or however eminent.

Compensation.—Who shall say that an operation which is really a series, involving oftentimes previous separation, not infrequently preparatory treatment and a temporary filling with gutta-percha, as careful shaping of the cavity as for gold, the adjustment of a suitable matrix, painstaking manipulation of material, attention to occlusion and points of contact, and lastly good polishing, again using the separator—*who shall say* that this is not worthy of compensation according to time and skill employed in full proportion with gold operations?

It is true that many dentists do not perform this class of work as well as they know how, because they fear that their patients, by reason of previous false education, will not be willing to pay for their best efforts? If so, it is equally true in every instance that the dentist is guilty of moral cowardice. He lacks the courage of his convictions, and by yielding to such a weak and unworthy impulse he will in time come to lack any adequate conviction whatever.

It is our duty now and in the future to educate our patients in this respect. They should have it explained and emphasized that the restoration of broken down teeth with our newer amalgams is a different proposition from that which obtained years ago; that its possibilities are far greater, but dependent, nevertheless, on the most careful operations, and therefore *entitled to remuneration in proportion to the skill employed and value received.* What they have paid in years past for "fillings" and "stoppings," and what unworthy operators may be "charging" for similar things now have nothing to do with the question of an adequate fee for the honest service I have attempted to outline and describe. Let us do this class of work as it deserves to be done, and let us place it on the plane in the estimation of our patients where it deserves to be placed in these new years of the twentieth century.—*American.*

FIXATION OF IMMEDIATE PROSTHETIC APPARATUS IN RESECTIONS OF THE MANDIBLE. By Dr. Claude Martin, Lyons. Read before the Munich Congress, 1902. (*L'Odontologie.*) About twenty-four years ago I proposed the method of immediate insertion of a prosthetic apparatus after resection of the maxillæ. I desire now to indicate an important simplification in the fixing method in one of the more complex cases, and you will be able to judge of its advantages and application. My practice since 1877 has remained fundamentally the same in the 130 to 150 cases where I have had occasion to apply immediately a prosthetic apparatus. From the extreme variety of the cases encountered I am convinced that my method is adapted to all exigencies, and for this reason I have made no essential change in my practice, which is simpler, more rapid, and offers greater security.

I will not cite all the cases in which application of this prosthesis has been made, but will describe one which presented at the outset the greatest difficulties in the construction of the apparatus and its

maintenance. When the resection affected the body of the mandible comprising a portion or the whole of the ascending ramus, the means of fixation had to be modified, and was more complicated. In fact, the apparatus could be fixed to the bone only by that extremity adjoining the remaining fragment. The other extremity was liable to be raised, and impinge upon the posterior wall of the upper maxilla of the same side, forming an obstacle to the closing of the mouth and to deglutition. It was necessary, therefore, to firmly attach the apparatus to the fragment remaining. This was done as follows: The teeth implanted in this fragment were encased in a grooved splint of tinned steel plate, or even of vulcanized rubber. This was fixed to the apparatus by means of a metal plate, which was screwed or soldered to the encasing piece, and fixed by means of screws to the artificial mandible. To give greater fixity, I have often been obliged to employ a spring attached to an upper plate in order to keep down the mandible. This supplementary fixture must in no case replace the external plates which, fixed by screws, unite the remaining fragment with the artificial mandible and insure the maintenance of the apparatus.

To obtain a firm attachment in cases of this sort it is needful to have recourse to rather complicated apparatus; consequently there will be occasional failures, especially by beginners. Hence I have felt great satisfaction in modifying or simplifying the procedure. To-day their attachment is much simplified; two screws suffice, in fact, to give them all the necessary solidity. To the apparatus which is to be joined to the remaining fragment I fix first, as usual, on the internal side a plate to be applied simply to the internal surface of the osseous fragment; then to the external portion I fix two plates (as in all apparatuses of this kind), which on the one hand are screwed to the remaining artificial piece, and on the other to the remaining fragment; but instead of being horizontal they must be crossed in X-fashion. This simple arrangement renders the encasing piece unnecessary, and gives even greater solidity.

Where the immediate prosthetic apparatus is not between two osseous fragments, it is necessary to retain the fragment in its normal position by wings which prevent it from being drawn inwards. As I have frequently described these wings, I will only recall the fact that one of the plates which compose them is fixed to an upper plate, the other to a little piece supported by the remaining frag-

ment; the lower plate ought to pass outside the upper in such a manner that the latter prevents the deviation of the fragment inwards. These plates should have a sufficient length to slide upon each other and remain in contact.

This wing-system can also be employed for ante-operative cases where for some reason immediate prosthesis is undesirable. For it is well to avoid as far as possible the deformity resulting from the resection, and particularly the luxation inwards of the remaining fragment. The winged apparatus, put in place before the operation, retains it in relation to the superior maxilla. Moreover, it facilitates the subsequent adaptation of appliances to depress the tissue of the resected part, and thus restore the outline of the face. It must be noted, nevertheless, that this ante-operative prosthesis is possible only when there is a certainty of leaving sufficient of the mandible to afford support. It is necessary to fit the apparatus at least the day before the operation, so that the patient may be accustomed to it; withdraw it at the moment of operation and replace immediately after.

CIVILIZATION AND THE BIRTH-RATE. M. Neymarck (*New York Sun*) has lately examined various economic, financial, and social causes that influence the birth-rate. Some of his results are summarized in what follows. He believes in the first place that the birth-rate will always diminish with the increase of "civilization," with "progress," in a country. In Germany the birth-rate was forty-two per thousand in 1875; in 1895 it was thirty-six. In England the rate diminished from thirty-six to twenty-nine in the same period. In France it fell from twenty-six to 25.2. The rate of diminution is therefore least in France. Some of the economical causes influencing the birth-rate are:

First.—The increased cost of living, or more accurately, the increased scale of comfort. As a matter of fact, it is not certain that the cost of life has increased, but our requirements have become greater.

Second.—The desire to insure increased comfort for one's self and one's family. "The father of a family limits his offspring in proportion to his egoism."

Third.—The desire to establish one's children well in life is proved by curious statistics. In France there were 281,353 heritages in the

direct line to divide 3,469,000,000 francs; of these 170,819 heritages, amounting to 2,131,000,000, were allotted to one or two children; 75,961, amounting to 926,000,000, were divided between three or four children, and 34,573, amounting to 412,000,000, were divided between five or more children.

Fourth.—The reduction of the rate of interest runs parallel to the decrease in birth-rate. In France the birth-rate was in 1872, 27.8 per thousand; in 1880, 25.6; in 1890, 22.9; in 1900, 22.4. The three per cents produced in 1871 about 5½ per cent on the investment; in 1880 about 3½ per cent; in 1890 about 3¼ per cent; in 1900 less than 3 per cent.

Fifth.—The increase of taxes and the indirect effect of the obligations of military service must also be considered.

Sixth.—The entrance of women into competition with men as wage-earners. In France there are now 3,353,831 women who are thinking less of maternity, as they are more or less interested in their professions or trades. There are 3,861,599 single women, 1,808,838 families without children, 3,000,000 divorced or widowed persons without children—nearly 6,000,000 persons in all these categories.

MORBID CONDITIONS OF THE MOUTH. By Edmund W. Roughton, B. S. Lond., F. R. C. S. Eng. (*Lancet.*) During the ten years that I have been attached to the National Dental Hospital I have gained the impression that diseases of the mouth, and more especially of the teeth, are not so familiar to medical practitioners as they ought to be. I think it is unfortunate that there are no facilities for the newly qualified man who is preparing for general practice to attend a short dental course, not with the object of becoming proficient in dentistry, but to furnish him with a knowledge which I am sure would prove of great use in after life, more especially to those who are about to practice in country districts, where expert dentistry is not obtainable. This remark applies with even greater force to army and navy surgeons. Another reason why dental disease does not receive the attention it deserves at the hands of the general practitioner is that there is a tendency among many medical men to regard dental disorders as the exclusive province of the dentist, and as having nothing to do with medicine or surgery proper.

The mouth is a very perfect bacteriological incubator, and as a natural consequence is at all times teeming with myriads of micro-

organisms. For our knowledge of the mouth bacteria we are indebted chiefly to Miller, who has shown that very many varieties of organism, both pathogenic and non-pathogenic, may be found in the mouth; he has isolated and cultivated more than one hundred different species and has established the fact that the mouth is the receptacle and often the breeding ground of many specific organisms, and is the source through which many serious and even fatal diseases may take place.

The conditions which obtain within the mouth are extremely favorable for bacterial growth. The temperature—viz., 37° C.—is that at which we keep our warm incubators in the laboratory; sufficient access of air is afforded for those germs which require oxygen or are indifferent to its presence. Food materials (culture media) are present in abundance; fragments of food remaining after a meal, cast off epithelial cells, saliva, buccal mucus, inflammatory exudations from the gums, exposed pulps of teeth, and even dentin itself when decalcified, all serve as culture media for bacterial growth.

With such favorable conditions, and the frequent entry of germs into the mouth with air, food and drink, it is little to be wondered at that so many organisms are constantly found; indeed, one might expect to find every germ in the bacteriologist's catalogue were it not for the fact that the struggle for existence is in operation here as elsewhere, causing the stronger to prevail and the weaker to perish. Thus it happens that although many species of bacteria may be at times found in the mouth, the regular tenants are but few in number. There are about six species of organisms which seem to find the conditions of the mouth exactly to their liking; they flourish and crowd out all others. Do they do any good? Do they do any harm? The first question has not been as yet fully answered, but it is probable that they take some share in the process of digestion. That these bacteria may do harm is well known. I will deal with some of the morbid conditions which they produce.

It is well known that extensive dental caries may be present without toothache or pain of any kind, especially so long as the person is in good health; but it not uncommonly happens that diseased teeth, previously the seat of little or no pain, are prone to ache when the patient has become lowered by disease or exhaustion, or when the buccal secretions become vitiated by dyspeptic derangement or in pregnancy.

In acute inflammation of the antrum severe toothache and facial neuralgia are common, especially when temporary blockage of the ostium maxillare leads to retention of discharge under pressure. In such cases even teeth which have long since been extracted may appear to ache. This is doubtless due to involvement of the superior dental nerves. In chronic empyema of the antrum pain is not common, and when present is often in the supraorbital region, and may lead to a false suggestion of disease of the frontal sinus. Syphilitic nodes, foreign bodies, exostoses, necrosis, or other lesions involving some part of the fifth nerves might be added to the list of diseases causing healthy teeth to ache or to seem to do so. Lastly, there are cases of toothache and pain in other parts of the distribution of the fifth nerve not due to any discoverable organic lesion of teeth, nerves, or other parts.

I now come to a branch of my subject which is of a more speculative character, the so-called dental reflexes. Unfortunately, a knowledge of these undoubted reflex neuroses has led many writers to attempt to explain away many obscure symptoms and conditions, most of which probably have nothing to do with the nervous system. The sympathetic system is their sheet anchor, and they seem to think that the chief function of these imperfectly understood nerves is to produce pain in the wrong place and to lead the practitioner away from the true scent in his hunt for the seat of disease. The specialist is usually the worst offender in this respect, and it may be remarked that he does not usually try to refer symptoms in his own little sphere to disease in distant parts that he is not accustomed to operate on. As far as my experience and reading go, the dentist is not prone to overestimate the remote effects of dental disease, the records of so-called dental reflex neuroses being from the pens of practitioners in other branches of the healing art. It is, however, an undoubted fact that reflex spasms may be due to dental disease. I have frequently seen cases in which trismus or inability to open the mouth was dependent upon spasms of the muscle of mastication due to an impacted lower third molar. Owing to want of room between the second molar and the ramus of the jaw, or owing to some malposition of the tooth itself, the third molar is unable to assume its normal position, and by the pressure it exerts on neighboring structures sets up irritation which induces a state of tonic spasm of the masseter, pterygoid, and temporal muscles.

Although muscular spasm may certainly be of dental origin it appears very doubtful whether paresis or paralysis is ever due to the same cause. There are, however, many cases on record in which so-called reflex paralysis is attributed to dental disease. Thus Gillman, Evarts and Coale each record a case of facial paralysis due to carious teeth; Whitney relates a case of paralysis of the arm from dental irritation, and Salter gives a case of paralysis of the arm from an impacted and carious third molar, and others might also be cited. But although the paralytic conditions are usually said to have disappeared after dental treatment, it seems to me very difficult if not impossible to prove that they were due to the teeth and not really of the nature usually designated "hysterical"—whatever that may be.

Many cases of ophthalmic disease supposed to be due to diseased teeth are on record. Pain in the eye and excessive secretion of tears may certainly be due to dental irritation, but so far as I can discover there is no authentic case which definitely proves that any actual eye disease is really a reflex dental neurosis. Mr. Henry Power believes that carious teeth are a common cause of phlyctenular ophthalmia; the two conditions, however, are so common that it would be strange were they not often associated. Sir W. J. Collins, who has devoted much attention to oculo-dental affections, asserts that he knows of no case of ophthalmoplegia of any kind due to dental disease. It must be admitted, however, that there are some cases on record in which the association between dental disease and amaurosis is, to say the least, remarkable.

Many diseases of the ear have been attributed to dental disease, but I think without sufficient evidence. Epilepsy, mania, delusions, and other nervous disorders, including neuroses of the alimentary canal, larynx, heart, and uterus, as a sequel of dental irritation, have from time to time been described by writers. When I say that in the list may be found cases of vicarious menstruation and urethral catarrh, you will probably agree with me that I have pursued the subject far enough.

SYPHILITIC INTERSTITIAL GINGIVITIS. By Eugene S. Talbot, M.D., D.D.S., Chicago. In the past year three patients with syphilitic infection of the mouth have been referred to me. A young Swedish domestic, twenty-four years of age, contracted the disease

by kissing. Syphilitic patches appeared upon the lower lip the size of a large filbert, involving the gums and alveolar process, with considerable uneasiness and pain at the roots of the teeth. The ulcer was nearly healed when she came to me.—Mr. H., thirty-two years of age, also contracted the disease by kissing. The central lesion appeared at the lower lip. When I saw him secondary syphilis had caused his body to become completely covered with a rash. Large mucous patches covered the mouth. The gums and alveolar processes were of a deep-red color and the teeth were sore to touch.—Mr. A., twenty-seven years of age, clerk in a wholesale dry-goods house, became infected by moistening labels with saliva. Although under treatment, his face and body became completely covered with eruptions and the alveolar process and gums were badly inflamed. The cervical glands in all cases were enlarged.

These cases are receiving special local treatment by me. This consists in cleansing the teeth (a special set of instruments are kept for this purpose) and local treatment with iodin. Mrs. H., the case I reported some time ago, returned with slight uneasiness in the alveolar process at the third right inferior molar. The usual iodin treatment is being given. It would seem, from the experience I have had with local iodin treatment in syphilitic interstitial gingivitis, that though relief from uneasiness and pain is all that one could wish, it is apt to return unless systemic treatment is adopted. The uneasiness and pain in the alveolar process about the roots of the teeth are not confined to syphilitic interstitial gingivitis alone. Interstitial gingivitis from whatever cause will produce the same symptoms, including redness, due to the inflammatory process and bone absorption extending throughout the alveolar process. In the lower animals this uneasiness and pain is best illustrated by the cribbing of the horse returned to the stall after a summer's outing.—*International.*

EXTRACTION AND REPLANTATION.—There are many cases in which extracting and replanting offer the easiest, quickest, least painful, and most satisfactory way to cure abscessed teeth. Immediate relief from pain is secured, inflammation rapidly subsides, all necrosed bone can be removed with absolute certainty, the canal can be filled perfectly and you have a complete guarantee that all the usual causes of abscess have been eliminated.—W. D. COWAN, *Dominion Jour.*

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Editorial.

DECISION OF INTEREST

In view of our practice of keeping the members of the Protective Association informed upon all important points in the litigation conducted by that organization, we have this month to report a decision of importance. In the case of the International Tooth Crown Company versus the Hanks Dental Association, which was defended by the Protective Association, the judge in the United States Circuit Court compelled Dr. Hanks and other dentists to appear and submit to an examination as to the work done, their books, and their patients. The case was appealed, and the judges constituting the United States Circuit Court of Appeals have refused to sanction this practice, and have certified the question as to whether such practice is legal and proper or not to the Supreme Court of the United States for determination. That Court will probably not reach the question for some time, as the case will be placed upon the calendar, but it will form such important subject matter of trial that the Attorney General of the United States will in all probability appear and file a brief in the case. The decision of the Supreme Court upon this point will be final as to the power of any federal judge to compel any defendant dentist to submit himself to examination, and to produce his books and papers before the actual trial of the case. This is a substantial victory for the members of the Protective Association, as it guarantees them and their patients immunity from any harassment by the attorneys of the Crown Company in the way of examination before the trial of their cases in court.

COMMON FAULTS OF DENTAL WRITERS.

The season of dental meetings is upon us, so a few words to those who are to present papers at the various state and local gatherings may not be out of order. To begin with the beginning, the indefinite, meaningless title is entirely too frequent. Many a valuable obser-

vation, conscientiously recorded, is buried forever because the title does not clearly and explicitly indicate the scope of the article. The title should state as briefly as possible the main thought of the author, so that the reader may see at a glance whether the article is upon a subject in which he is interested.

Papers should not begin with an apology. At least one-third of those presented before dental societies are prefaced somewhat in this way—"I know very little on this subject and do not see why I was selected to write such a paper;" "I have been very busy and have not had time to do much original work along this line, so will quote from the well known authority, etc.;" "It is presumptuous for me to endeavor to instruct such a body of learned men," etc., ad nauseam. In the first place, the program committee should use more judgment than is generally exercised in assigning subjects, but if a member is asked to write a paper along a line with which he is not familiar, and with which he is unable to do any work of importance before the meeting, he should decline to serve, instead of assuming the obligation and then being forced to apologize for his ignorance and inability at the meeting. If a man is competent to write upon a given subject, or feels that before the time of meeting he can do some original research work that will be of interest and value to the society and profession, he should begin at once. It is an insult to his fellow members, to the society, and to that portion of the profession who will read his article when printed, for a man to write or even finish his article on the way to or after he arrives at the meeting place. Yet we say without fear of successful contradiction that this happens in many cases, and we know that fully one-half the papers presented each year are not completed one week before the date when they are to be read. The greatest injustice of all is done to those who are to discuss the papers. We have never been able to see the sense of previously appointing certain men to open a discussion, when up to the time of meeting no one, not even the author himself, has any idea of what the paper is going to be. It should be an iron-clad rule in all dental societies that an essayist must send a typewritten copy of his paper at least one week before the meeting to each of those who have been selected to discuss it. Such a plan would not only insure better papers, but a more intelligent and valuable discussion, which latter is a consummation devoutly to be desired.

Probably three-fourths of all papers published have been read

before dental societies. They have been prepared hurriedly and the subjects have not been well thought out. Essayists should remember that their papers will be placed before thousands in printed form, and should prepare them with the thought of the thousands of the readers in mind rather than the one or two hundred auditors who will be present at the meeting. The less of self injected into the production, the more acceptable and convincing it will be. Many make the mistake of thinking that because a paper sounds well when read, and is vigorously applauded, it will read well when printed.

The average writer consumes too much time and space with prefatory observations, local personal references, and long-winded introductories. Every author should give a concise but complete summary of his deductions at the end of an article, especially if it is of unusual length. It is well to remember that long articles are not necessarily scientific, although this may be information to some whose names are frequently seen in print. The majority of articles submitted for publication could be cut down one-half and not a thought be eliminated in so doing. Readers should not have to run fan-mills in their brains to separate the wheat from the chaff. At a society meeting an essayist may ramble on and on, and the majority of his auditors will out of courtesy endure it, but the average dental reader is not so tolerant, and if the writers of verbose and unnecessarily long articles realized how unpopular the latter are with readers there would be fewer written.

Notices.

NEBRASKA STATE DENTAL SOCIETY.

The annual meeting of the Nebraska State Dental Society will be held at Lincoln, May 19-22, 1903.

H. R. HATFIELD, Secretary, York.

IOWA STATE DENTAL SOCIETY.

The next annual meeting of the Iowa State Dental Society will be held at Sioux City, May 5-7, 1903.

W. R. CLACK, Secretary, Clear Lake.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

The Southern Wisconsin Dental Association will hold its annual meeting at Janesville, May 20-21, 1903. Every effort has been made to have a large and interesting meeting. Prominent members of the profession will present

papers, and some of the most noted clinicians will operate. All reputable members of the profession are cordially invited to be present.

C. W. COLLVER, Secretary, Clinton.

MISSISSIPPI STATE BOARD OF DENTAL EXAMINERS.

The Mississippi State Board of Dental Examiners will meet at Jackson, May 26, 1903, at 8:30 a. m.

W. R. WRIGHT, Secretary, Jackson.

KANSAS STATE DENTAL ASSOCIATION.

The thirty-second annual meeting of the Kansas State Dental Association will be held at Emporia, May 14-16, 1903.

G. A. ESTERLY, Secy., Lawrence.

KENTUCKY STATE DENTAL ASSOCIATION.

The annual meeting of the Kentucky State Dental Association will be held at Bowling Green, May 25-27, 1903. The profession in this and neighboring states are cordially invited to be present.

C. R. SHACKLETTE, Secy., Louisville.

FLORIDA STATE BOARD OF DENTAL EXAMINERS.

The Florida State Board of Dental Examiners will meet at Sea Breeze, May 26, 1903. All applicants for examination are requested to be present on that date.

E. M. SANDERSON, Secy., Jacksonville.

MISSOURI STATE DENTAL ASSOCIATION.

The thirty-ninth annual meeting of the Missouri State Dental Association will be held at Kansas City, Mo., May 19-21, 1903. Reduced railroad and hotel rates have been secured, and a very large attendance is assured. A number of dentists of national reputation, among them Drs. J. B. Willmott, Toronto; E. K. Wedelstaedt, Minneapolis, and A. C. Searl, Owatonna, Minn., will present papers and give clinics. All ethical members of the profession are cordially invited to attend, take part in the discussions, and become members.

OTTO J. FRUTH, Secretary, St. Louis.

ALABAMA STATE BOARD OF DENTAL EXAMINERS.

The Alabama State Board of Dental Examiners will meet at Birmingham, May 11, 1903. In addition to the regular written examination the following requirements are added—each applicant must fill at least two teeth, approximal cavities, one with gold, the other with amalgam, the work to be done under the immediate supervision of the Board, which will determine suitable selection of cavities. The Board will endeavor to furnish patients, but failing to do so, applicants for license must find or bring their own subjects, also instruments and material. Each applicant must bring a partial upper denture

of not less than eight teeth ready for soldering, hard solder required, which work must be done under the supervision of the Board.

T. P. WHITBY, Secy., Selma.

TEXAS STATE DENTAL ASSOCIATION.

The twenty-third annual meeting of the Texas State Dental Association will be held at Houston, May 14-16, 1903. This meeting promises to be the best ever held in Texas, and all members of the profession are invited to attend.

BUSH JONES, Secretary, Dallas.

KANSAS STATE BOARD OF DENTAL EXAMINERS.

The Kansas State Board of Dental Examiners will meet at Kansas City, Kan., May 4-8, 1903. The examination will be theoretical and practical. Applicants must provide their patients, instruments and materials, and be prepared to construct a plate and crown, and to insert a gold, amalgam, and cement filling. The theoretical examination will be the same as usually given. For particulars, address

J. P. ROOT, Secretary, Kansas City, Kan.

VERMONT STATE DENTAL SOCIETY.

The twenty-seventh annual meeting of the Vermont State Dental Society was held at Burlington, March 18-20, 1903, and the following officers were elected for the ensuing year: President, J. H. Jackson; 1st Vice-president, H. Burbridge; 2d Vice-president, G. F. Barber; Secretary, Thomas Mound; Corresponding Secretary, Grace L. Bosworth; Treasurer, W. H. Munsell; State Prosecutor, J. A. Robinson; Executive Committee, G. O. Mitchell, J. C. Hindes, C. H. Kent. The next meeting will be held in Montpelier the third Wednesday in March, 1904.

THOMAS MOUND, Secretary, Rutland.

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

The next regular meeting of the Illinois State Board of Dental Examiners, to examine applicants for license to practice dentistry in this state, will be held in Chicago, May 1-2, 1903.

Under an opinion of the attorney-general the following are eligible to take the examination before the Board: "Anyone holding a medical diploma from a reputable medical college; anyone who has been a legal practitioner of dentistry for ten years prior to moving into the state, and anyone who failed to register in this state at the time the law went into effect, which was in 1881."

Candidates must furnish their own patients, and come provided with the necessary instruments, rubber-dam and gold to perform practical operations and such other work as is deemed advisable by the board. Those desiring

to take the examination should matriculate with the secretary at least ten days before the date of meeting. The examination fee is $10. Any further information can be obtained by addressing the secretary.

J. G. REID, Secretary, 1006 Champlain Bldg., Chicago.

SEVENTH DISTRICT DENTAL SOCIETY OF NEW YORK.

The thirty-fifth annual meeting of the Seventh District Dental Society of the State of New York will be held at the Osburn House, Rochester, April 14-15, 1903. This is expected to be one of the best meetings in the history of the Society. Several valuable and interesting papers will be read by prominent members of the profession, and a large number of clinics will be given. If you have anything of interest, communicate at once with the business committee. Mark the dates off now in your appointment book.

Business Committee—C. F. Bunbury, Chairman; B. S. Hert, I. C. Edington, all of Rochester.

News Summary.

H. C. WAIT, a dentist at Boston, died recently.

D. F. RUPP, a dentist at San Diego, Cal., died March 27, 1903.

H. D. GARVIN, a retired dentist at San Diego, Cal., died Feb. 11, 1903.

JOSEPHINE D. PFEIFER, a dentist of Chicago, has been adjudged insane.

A. R. REID, 28 years old, a dentist at El Paso, Tex., died March 3, 1903.

F. W. HILL, a dentist at Lincoln, Neb., died March 5, 1903, of pneumonia.

W. T. HYSLOP, 72 years old, a dentist at Pine Bluff, Ark., died recently.

J. W. MCLEAN, a dentist at Waitsburg, Wash., has been adjudged insane.

H. POWELL, 78 years old, a dentist at Greenfield, Ill., died February 24, 1903.

A. W. SMITH, 58 years old, a dentist at Ithaca, N. Y., died March 17, 1903.

S. L. MINTZER, 83 years old, a dentist at Philadelphia, died March 22, 1903.

S. T. ADAMS, a dentist at Richmond, Va., died recently after a short illness.

H. W. REABEN, 60 years old, a dentist at Summit, Miss., died February 27, 1903.

R. G. ALEXANDER, a dentist at Sault Ste. Marie, Ont., died suddenly March 7, 1903.

A. B. KING, a dentist at Baltimore, had his leg broken by a street car, March 10, 1903.

L. McC. GIBBS, 40 years old, a dentist at Columbia, S. C., died February 24, 1903.

T. M. SAGAR, a dentist at Marysville, O., is dangerously ill with softening of the brain.

DIRECT AND ALTERNATING CURRENTS.—A continuous electric current flows like a stream of water, steadily in one direction. An alternating current flows

by rising to its full voltage and then falling to its least.—*Power and Transmission.*

J. W. FARRINGTON, a dentist at Bisbee, Ariz., is seriously ill and not expected to live.

J. L. HILL, 72 years old, a retired dentist of Gettysburg, Pa., died suddenly March 4, 1903.

J. W. SCRIBNER, 56 years old, a retired dentist at Charlottesville, Va., died March 15, 1903.

FRANK MULHOLLAND, 36 years old, a dentist at Manitowoc, Wis., died March 14, 1903.

S. B. PALMER has retired from active practice of dentistry, after fifty-four years' hard work.

E. M. STEALEY, 25 years old, a dentist at San Francisco, committed suicide February 27, 1903.

C. H. JAMES, 69 years old, a dentist at Cincinnati, died March 12, 1903, after a short illness.

M. R. GRISWOLD, formerly a dentist of Hartford, Conn., died in the state prison, March 1, 1903.

B. VAN VLECK, a young dentist at Hammond, Ind., died March 11, 1903, from stomach trouble.

J. G. DIMOUSH, 37 years old, a dentist at Kansas City, Mo., died of tuberculosis, March 1, 1903.

W. G. WOODWORTH, 44 years old, a dentist at Detroit, died February 18, 1903, from pneumonia.

CHARGES PAINLESS.—A Kansas dentist advertises that his "tooth extraction and charges are painless."

R. CHAMNESS, 30 years old, a dentist at Penville, Ind., died March 12, 1903, of Bright's disease.

R. S. GREEN, one of the oldest dentists in Wisconsin, died March 1, 1903, at Whitewater, from grippe.

J. H. CALLENDER, 69 years old, a dentist at Wichita, Kan., died February 20, 1903, after a short illness.

W. A. CAMPBELL, 59 years old, a dentist at Brooklyn, N. Y., died March 17, 1903, after a short illness.

C. A. WOODWARD, 63 years old, a dentist at New York City, died March 7, 1903, from Bright's disease.

T. H. SEXTON, 30 years old, a dentist at Johnsonburg, Pa., died of acute alcoholism at Buffalo recently.

S. G. GROVE, 35 years old, a dentist at Cedar Rapids, Ia., was burned to death in a hotel fire, March 1, 1903.

ILLEGAL PRACTITIONERS.—A dentist at Atlantic City, N. J., has been arrested for practicing without a license.—A dentist at Athena, Ore., was recently fined $50 for the same offense.—March 6 a dentist in Brooklyn was fined $100

for practicing without a license. Three years ago he was fined for the same offense.

F. H. BULL, for many years in the practice of dentistry at Winfield, Kan., has suffered a severe stroke of paralysis.

NOAH TILLER, a young dentist at Pensacola, Fla., was accidentally shot and killed while hunting February 28, 1903.

J. P. SENNETT, formerly a prosperous dentist at Champaign, Ill., is reported to be going into a decline from acute alcoholism.

"FLANNELLED FOOLS."—The physician says that by "flannelled fools" Kipling meant those who take them off before the 1st of May.

FEVER BLISTERS ON THE LIP.—Paint with flexible collodion and salicylic acid, twelve grains to the ounce.—O. L. PEAK, *Alk. Clinic.*

H. S. COWMAN, 39 years old, proprietor of the Snowden-Cowman Dental Company, died March 8, 1903, after two days' illness, from kidney trouble.

BANKRUPT.—L. T. Foss, Boston, liabilities $3,033, assets $300. Some time ago he bought out a dental practice which had been located in the same spot for over fifty years.

EAST ST. LOUIS DENTAL SOCIETY was organized January 23, 1903, and the following officers were elected: President, A. Godejohann; Secretary and Treasurer, J. C. Reader.

JUST TOO LATE.—A firm of "painless extractors" at Nashua, N. H., tried to leave town without settling with several creditors, but the sheriff "saw them first," and they concluded to pay up before leaving.

DALY GOLD LINING DENTAL COMPANY BANKRUPT.—This corporation, which was organized some time ago to establish dental parlors throughout the United States, is admitted by the general manager to be bankrupt.

WESTERN PENNSYLVANIA ODONTOLOGICAL SOCIETY held its annual meeting March 12, 1903, and elected the following officers: President, C. C. Taggart; Vice-President, G. W. Gage; Secretary, B. M. Loar; Treasurer, J. A. Libbey.

JACKSONVILLE (ILL.) G. V. BLACK DENTAL CLUB held its annnual meeting March 9, 1903, and elected the following officers: President, C. B. Sawyer; Vice-president, W. W. Schermerhorn; Secretary, L. A. Reed; Treasurer, W. B. Young.

EXAMINING BOARD AFFAIRS.—F. G. Baird has been reappointed on the California State Board of Dental Examiners.—M. G. Sykes has been appointed a member of the Maryland Board.—L. S. James has been appointed or. the Minnesota Board, to succeed M. B. Cullom, and F. E. Moody has been reappointed.—W. G. Dalrymple has been appointed on the Utah Board.

HARVARD ODONTOLOGICAL SOCIETY held its twenty-fifth annual meeting and banquet at Young's Hotel, Boston, February 28, 1903. There were 71 guests and members present, and the society is in a flourishing condition, having altogether 106 members. The following officers were elected for the ensuing year: President, J. G. W. Werner; Recording Secretary, J. W. Estabrooks; Corresponding Secretary, A. H. Stoddard; Treasurer, H. W. Hardy;

Editor, H. L. Howe; Executive Committee, J. W. Estabrooks, W. P. Cooke, L. F. Bigelow.

KNOCK DOWN AND DRAG OUT.—A few days ago a man at Duluth went through the streets of the town, knocking people down and pulling their teeth. He extracted a number of grinders, including two sets of false teeth, before he was arrested.

ACCIDENTS.—March 10 the vulcanizer in the office of a dentist at Shelby, O., exploded, injuring the dentist and wrecking the office.—March 24 a dentist at Racine, Wis., was tending his furnace, when it exploded, destroying his eyesight and burning him terribly.

SOUTHERN DENTAL SOCIETY OF NEW JERSEY held its annual meeting at Camden, January 21, 1903, and elected the following officers: President, J. G. Halsey; Vice-president, A. Irwin; Recording Secretary, S. G. Callahan; Corresponding Secretary, C. Ironsides.

DIVORCES.—C. W. Marvin, a dentist at Findlay, O., is defendant in a suit for divorce brought by his wife, who claims that he has failed to support her. —William S. Caldwell, a dentist at Allegheny, Pa., has been again sued for divorce by his wife on the grounds of cruelty.

NEW ORLEANS ACADEMY OF STOMATOLOGY held its annual meeting March 11, 1903, and elected the following officers: President, H. P. Magruder; Vice-president, J. H. Landry; Secretary and Treasurer, Paul de Verges; Executive Committee, L. D. Archinard, C. V. Vignes, V. K. Irion.

TRI-CITY DENTAL SOCIETY, which is composed of the dentists of Omaha, South Omaha, and Council Bluffs, held its annual meeting February 21, 1903, and elected the following officers: President, F. H. Wallace; Vice-president, C. E. Woodbury; Secretary, Z. D. Clark; Treasurer, H. A. Foster.

SEAMLESS CROWNS.—In the construction of seamless crowns the use of cement is preferable to plaster for the model, as it is stronger and can be polished after it is carved. A fine vent-hole put through the model assures a perfect cast when it is dipped into the hot metal.—C. H. WARBOYS, *Register.*

CASUALTIES.—A man at San Bernardino, Cal., recently had several teeth extracted, and almost bled to death before the hemorrhage could be stopped.—A young woman at La Crosse, Wis., recently had a tooth extracted, and a week later her face and head swelled to such an extent that an operation was necessary.

HEMOPHILIA.—To increase the coagulability of the blood, Dr. C. E. Wallis (London) administers calcium chlorid in small doses for eight days previous to extraction, with the result that teeth are extracted without the least hemorrhage, earlier extractions having been followed by hemorrhage lasting thirty-six hours.

FATALITIES.—A man at Great Falls, Mont., died recently from inflammation of the brain. He was previously bitten by a hog, and abscesses followed. Upon examination his physician discovered ulcerations at the end of the root of a tooth and advised him to have it extracted, which he did. Blood poisoning set in and resulted in his death. His relatives now blame the

dentist, but ignore the hog.—Last month a woman at Merrimac, Mass., had a tooth extracted and died of blood poisoning four days later.—March 21 a woman at New Orleans had seven teeth extracted and died of anemia of the brain a few hours later.

CENTRAL PENNSYLVANIA DENTAL SOCIETY was organized at Altoona, March 7, 1903, and the following officers were elected for the ensuing year: President, J. W. Carter: Vice-president, T. Stine; Secretary, Julius E. Wood; Treasurer, H. E. Crumbaker. The society will meet twice each year, and the next session will be held October 6.

FIRES.—J. A. Turner, Lavonia, Ga., February 18, loss $500, insurance $300.—J. M. Bradt, Payette, Idaho, February 13, loss $200, no insurance.—K. S. Morgan, Minneapolis, February 19, loss $500, fully insured.—W. Ingram, Savannah, N. Y., February 28, loss $100.—M. F. Kelley, Commerce, Tex., March 10, loss $600, no insurance.—C. D. Krueger, January 23, loss $500.

CENTRAL DENTAL ASSOCIATION of Northern New Jersey held its annual meeting and banquet February 16, 1903, and elected the following officers: President, Wm. H. Pruden; Vice-president, C. W. Hoblitzel; Secretary, F. W. Stevens; Treasurer, C. A. Meeker; Executive Committee, J. S. Vinson, W. W. Hawke, T. S. Dunning, F. L. Manning, J. A. Voorhees.

MARRIED.—C. H. Bowen, Ansley, Neb.; Ethel Meek, Lewiston, Ill., February 16.—E. Bock, Fairfield, Ia.; Clara Gregg, Fairfield, March 8.—W. M. Brown, Blackshear, Ga.; Lelia Davis, Blackshear, February 18.—Marion Myers, Minerva, O.; Mabel Horn, Mansfield, January 14.—L. C. Holtzendorff, Valdosta, Ga.; Lilla Smith, Valdosta, February 19.

SUITED THE DENTIST.—Patient (after having teeth examined)—What do you think of them?

Dentist—Magnificent.

Patient—Then you don't find anything to do to them?

Dentist—Oh, yes. There are three to be pulled, seven to be filled and five to be crowned.

TO REHARDEN STEEL INSTRUMENTS.—To reharden tools that have been burned, they should first be cleaned. Then take common machine oil and forge cinders; make a bed of the cinders, heat the tools, put them in the cinder bed and pour the oil on them till they are partly cooled off. Having put plenty of oil on the tools, cover them with the cinders and ashes, burying them deeply. They should be left so for twelve or fifteen hours.—*Power and Transmission.*

FLY AS A GERM-CARRIER.—It has been quite conclusively proven during the last decade that the common house-fly is a means of transmission for various infectious intestinal diseases. J. Manning (*Jour. A. M. A.*) shows that the fly is also a direct factor in the transmission of the microorganisms of wound infection. Captive flies were allowed to crawl over dressings from infected wounds, over pus from a case of salpingitis, and over bronchitis sputum. They were then carefully transferred to culture-tubes and allowed to come in contact with the various media. During the experimentation forty-four culture-tubes were subjected to fly infection, and of this number forty-one

tubes showed colonization at the end of forty-eight hours, three tubes remaining apparently sterile. Pure cultures of the following were obtained: Bacillus pyocyaneus, staphylococcus pyogenes aureus, bacillus typhi abdominalis, bacillus coli communis, bacillus prodigiosus, sarcina aurantiaca, sarcina alba, moulds and fungi.

PHYSICIANS AS EXTRACTORS.—The *Medical World* of recent date contains a lengthy editorial instructing physicians how to extract teeth, describing the outfit needed, and urging them to take up the work. The article does not contain a word about what teeth should or should not be sacrificed. What would a physician think of a dental journal which advised dentists to perform amputations of various parts of the body, simply as a means of increasing their income.

BEAUTY COLLECTS BILLS.—A Chicago collector, who does considerable work for dentists, has in his employ a young and handsome woman, who makes it a point to dress stylishly. She first calls at the debtor's office, and if he refuses to pay the bill she visits his house at a time when she knows he will be away, but his wife will be at home. She refuses to tell the wife her errand, and one visit is usually sufficient, the man being anxious not to have his wife see her again.

INSCRIPTION ON METALS.—HOW TO WRITE.—Take 4 ounces of nitric acid and 1 ounce of muriatic acid, mix and shake well together, and it is ready for use. Then cover with beeswax or soap your metal surface to be engraved, write your inscription plainly in the wax clear to the metal, then apply the mixed acids with a feather or a stick of wood, carefully filling each letter; let it remain from five to ten minutes, according to appearance desired, then throw on water, which stops the etching process, and the inscription is complete.—*Stomatologist.*

VERRUCÆ OF BUCCAL MUCOUS MEMBRANE.—Dr. H. Kugler reported the case of Miss N., twenty-two years, German, who had warts on her hands for many years. These disappeared three years ago; two years ago a small growth appeared on the inner surface of the lower lip; gradually more appeared until at the present time the inner surface of both upper and lower lips and the buccal cavity on either side to the second molar teeth are covered with small warty growths. Lately a few have made their appearance on the outside of the upper lip, near the margin of the skin. There is no pain, but they are frequently bitten, bleed freely, and the main source of annoyance is their prominence and the consequent disfigurement the moment the mouth is opened.—*Jour. A. M. A.*

ECONOMY IN EATING.—The American, even the poorest, spends twice or thrice as much as he need or should upon his food. A capital illustration of this fact has been given of late in New York City, where a "one-cent restaurant" has been established, and has so far proved successful. A large bowl of pea-soup, hominy, or oats, etc., is served for one cent, and other things, coffee, bread and butter, beans, pudding, etc., at from three to five cents. A meat dinner for ten cents was offered but proved unpopular. Any of the one-cent portions contain food elements sufficient to supply the nourishment

required in a full meal. Two or three of these one-cent portions per day, if varied according to appetite, should maintain the weight, strength, and health of an ordinary individual for an indefinite time, if such extreme economy is necessary.—*American Medicine.*

NASOPHARYNGEAL TUBE FOR PROLONGED NITROUS OXID ANESTHESIA.—Harvey Hilliard in the *Lancet* describes a gas apparatus to which are attached two tubes, one running to an ordinary mouth-piece, such as is used for nitrous oxid anesthesia, and a second which terminates in a curved tube, destined to be introduced into the nasopharynx. The gas is turned on to the ordinary apparatus and the administration is conducted in the usual way until the stage of light-anesthesia is reached; the face-piece is then removed, the tube passed into the pharynx, and the anesthesia continued. The average length of anesthesia in one hundred cases was 2.75 minutes. The author claims that this apparatus renders the use of ether in dental surgery unnecessary, that it is more convenient and economical than any other apparatus employed with the same object in view, and that it is free from danger to the patient and damage to the mouth, nose and pharynx.

TURKISH PUNISHMENT.—From Constantinople comes the following story: Abdul is a man of broad views; he acknowledges the right of his subjects to get as drunk as they please in their own homes; but woe betide them if they are found in a public dramshop. An unfortunate policeman discovered the other day in a state of intoxication was haled before a pasha, to whom he explained that he had taken a little wine for his tooth's sake. Immediately a barber-surgeon was called in to examine the man's mouth, but no decayed tooth was found. The policeman therefore had to point out the offending molar, which was at once extracted and handed to the pasha. That gentleman at once informed the barber that he had taken the wrong tooth, and ordered him to remove the one next to it. This was done, and the poor policeman was dismissed, with the parting shot that his remaining teeth were not likely to ache to the extent of making him forget the imperial prohibition regarding drink.

METHOD OF TAKING A BITE FOR FULL UPPER DENTURES.—Obtain a plaster model of the upper jaw and adjust wax base plate in the usual way. Place a roll of wax on the surface of the base plate corresponding with the alveolar ridge, and high enough, that when placed in the patient's mouth it will be even with the lower border of the upper lip at the median line. The wax should be trimmed in such a manner that all of the lower teeth will touch it at the same time. This wax when hardened keeps the jaws the proper distance apart. Another layer of wax should now be added, and kept soft to take the impression of the cutting edges and occlusal surfaces of the lower teeth. After the base plate with wax attached is placed in the mouth the patient is requested to *close* the jaws. The hard wax will act as a stop and prevent the patient from bringing the jaws too close together, while the soft wax, which was added later, will take the impression of the lower teeth in their proper relationship to the upper jaw. It has been found in a large percentage of cases that the cutting edges of the upper central incisors extend somewhat

below the upper lip when it is in its normal position, and also outside of and below the cutting edges of the lower incisors. This will bring the cutting edges of the lower incisors about even with the lower border of the upper lip when the mouth is closed, and the wax which is used to keep the patient's jaws the proper distance apart should be even with the lower border of the upper lip.—*Review.*

MOULDING SHEET BEESWAX.—F. J. Patterson in *Review*—To construct a mold secure two boards (any seasoned hardwood) five-eighths to seven-eighths thick, four inches wide, twelve inches long. Bevel each board upon one edge, lengthwise of the board. Cover each board upon beveled side with sheet tin, carrying tin over the beveled edge and tack to place. Secure four strips of brass or other metal, one piece eleven inches long, three pieces three and one-half inches long, all of which are to be one-quarter of an inch wide and as thick as baseplate. Place the long strip lengthwise of one of the boards one-quarter of an inch from lower edge of tin. Fasten in position with solder or screws, and place the shorter two strips at either end at right angles to the long strip, the third strip to be placed midway between the end strips and parallel with them. Secure short strips in position.

Place the two boards with tinned surfaces approaching each other, and upon the lower edges place two brass hinges. The mold is opened and the tinned surfaces amalgamated to prevent the wax adhering to them, and all surplus mercury removed with a cloth. Close the mold, and with a pair of small iron clamps, or two blocks of wood cut out in form of a clamp, the mold is held in position, and ready to receive the heated wax poured into the beveled space. Two sheets of wax may thus be made with one pouring, and the mold opened the moment the wax is cooled. Pure beeswax may be used, with the addition of a few drops of spirits of turpentin to regulate its toughness.

DAMAGE SUITS.—A woman in Philadelphia recently sued a dentist for $10,000, claiming that he had improperly filled a tooth and that an abscess subsequently developed. The jury, however, found for the dentist.—A judge in Chicago has issued a permanent injunction restraining a dentist from beginning suit against a patient to recover $1.50, which the dentist alleges is due him for the extraction of seven teeth.—A man at Los Angeles has sued his dentist for $300 for extracting a sound tooth.—A man at Worcester, Mass., sued his dentist to recover the value of some gold fillings, crowns, etc., which he alleges the dentist took from his mouth while doing other work. The judge threw the case out of court.—A woman at Muscatine, Ia., has sued a dentist for $5,000 damages, alleging that after he extracted a tooth her face became partially paralyzed on that side.—A woman at Jamestown, N. Y., has sued a firm of dentists for $2,000 damages, claiming that two years ago, when extracting some teeth, they dropped one, a cork, and an instrument down her throat. She claims that some time later she coughed up all three of the foreign articles, but that her health was permanently injured.—A woman in Chicago has sued a dentist for $25,000 damages, claiming that the work he did on her teeth caused her to lose the power of speech and hearing.—A

woman at Springfield, Ill., has sued her dentist for heavy damages, claiming improper dental work.—A dentist at San Jose, Cal., has been sued by the parents of a boy, who claim that the dentist left a quantity of arsenic in a tooth, thereby wrecking the youth's health. The damages asked are $1,100.—A woman dentist of Cripple Creek, Colo., has sued a railroad company for $60,000 damages for injuries, which she claims to have received in a wreck on the road.

ROBBERIES.—March 6 two dental offices at Vincennes, Ind., were burglarized to the extent of $250.—February 25 a dentist at Geneva, Ill., was robbed of a quantity of gold and material.—February 26 two dentists at Elgin, Ill., were victimized.—A clever individual recently robbed the dentists in several towns south of Chicago by feigning toothache, and robbing the office while the dentist was called out.—California has been suffering from an epidemic of this sort of thing. Dentists at Oxnard, San Bernardino, Long Beach, Pomona, Bakersfield, Los Angeles and other towns have been robbed of various amounts of gold, cash and material, evidently by the same gang.—This burglarizing of dental offices seems to be on the increase, and we would urge our readers everywhere to either buy safes, secrete their valuables before leaving the office for the day, or take home with them at night anything that would strike the fancy of a thief. These robberies usually occur in small towns, where the police force is inadequate and the thieves are miles away before the loss is discovered. It is only rarely that one of them is caught.

MASSAGE OF THE HEART, in case of its stoppage, to revive its movements has been recommended and experimentally demonstrated, but the first successful case of its use in man was reported by Dr. E. A. Starling at a recent meeting of the British Society of Anesthetists. In an operation for appendicitis on a man aged sixty-five, under nitrous oxid and ether anesthesia, both pulse and respiration ceased together, and artificial respiration and traction of the tongue failed to revive them. Then the surgeon, Mr. W. Arbuthnot Lane, pushed his hand up through the abdominal wound and grasped the motionless heart through the diaphragm. He squeezed it and felt it start pulsating, though no radial pulse could be felt. Artificial respiration and other restoratives were continued, and in about twelve minutes natural respiration reappeared and the pulse became perceptible at the wrist. The operation was then completed without the use of the anesthetic and the patient made a good recovery, with, however, some diaphragmatic tenderness. This rough-and-ready method and its success in this case are suggestive of important possibilities, and demonstrate that cutting operations in these cases are not essential and can be avoided. The previous failures followed extensive exposures of the heart, either by rib resection or incision through the diaphragm, as recommended by Mauclaire (in two cases). This of itself introduces a serious complication, and Lane's success was probably mainly due to his avoidance of this. "The case," as the *Lancet* remarks, "justifies us in saying that, if during laparotomy the patient's heart stops, the case should never be abandoned as hopeless until manual compression of the heart through the diaphragm has been performed."

REMOVING CRYSTALLIZED CALCIUM SULPHATE FROM RUBBER DENTURES.—To remove the calcium sulphate which adheres to the inner surface of vulcanite plates after vulcanization, especially where the ridge is narrow in a lower case, or the rugæ deep in an upper, making these surfaces hard to clean and polish, the deposit can be removed by placing the plate in a strong solution of HCl for a short time. Then by using a cup-shaped brush wheel carrying pumice and oil it may be made clean and smooth.—J. A. BULLARD, *Review.*

MORPHIN POISONING AND NORMAL SALT SOLUTION.—It is well known that dilutions of poisons in the blood, otherwise fatal, are a very ready means of saving life. No better example can be furnished than that of bloodletting, followed by saline infusion, in cases of attempted suicide by illuminating gas. The infusion of salt solution was recently employed with apparently marked success by E. F. Willoughby (*Lancet*) in a case of morphin poisoning of remarkable severity, since the patient had taken eight grains of the drug without having acquired any previous tolerance. For several hours continuously the ordinary well-known means of treatment were employed without much success, and finally a saline infusion was given. Immediately afterward the patient began to improve and from that moment on recovery was assured. The observer feels that this step, together with the administration of permanganate of potassium by mouth and by rectum for the purpose of breaking up the morphin eliminated through the digestive tract, was probably chiefly responsible for the patient's recovery.

THE DOCTOR WHEN HE'S SICK.—Dr. George Thomas Palmer of the *Chicago Clinic* is responsible for the following:

In my many years of labor
  I have tried most every stunt;
Cured the yells of babes with colic,
  Soothed the toper's gouty grunt;
Charmed the snakes of wily boozers,
  Quelled the nerve storms of the dames,
Shot with pills at strange diseases
  When I didn't know their names.

I have patched the voice of singers,
  And have robbed the sneeze from grippe,
Knocked the chills clear out of ague,
  Cured the smallpox every trip;
But one stunt has always floored me,
  Always will—this little trick—
Giving pills and soft emulsions
  To the doctor when he's sick.

You have seen his sweet persuasion,
  Heard him swear "it tasted good,"
Heard him say, "this will not hurt you"
  (Then you'd vacate if you could);

Heard him swear he had no patience
With a man who couldn't take
Any sort of pill or nostrum
For his pain or for his ache.

Heard him tell you not to grumble—
"Grumbling does no good," says he,
As he rolls a nasty powder
In a paper on his knee.

Then you ought to see the doctor
When he's laid up for repair,
Ought to hear the old boy growling,
Ought to hear the doctor swear;
And you ought to see the nurses
When the time comes for his dope—
If you had their job before you,
You would bid farewell to hope.

Envoy:
You may be amazing clever,
Up to almost every trick,
But you're faded when it comes to
Dosing doctors when they're sick.

PINEAPPLE AS A DIGESTIVE AID.—The *Lancet* states that the partaking of a slice of pineapple after a meal is quite in accordance with physiological indications, since, though it may not be generally known, fresh pineapple juice contains a remarkably active digestive principle similar to pepsin. This principle has been termed "bromelin," and so powerful is its action upon proteids that it will digest as much as 1,000 times its weight within a few hours. Its digestive activity varies in accordance with the kind of proteid to which it is subjected. Fibrin disappears entirely after a time. With the coagulated albumen of eggs the digestive process is slow, while with albumen of meat its action seems first to produce a pulpy gelatinous mass which, however, completely dissolves after a short time. When a slice of fresh pineapple is placed upon a raw beefsteak the surface of the steak becomes gradually gelatinous, owing to the digestive action of the enzyme of the juice. Of course, it is well known that digestive agents exist also in other fruits, but when it is considered that an average size pineapple will yield nearly two pints of juice, it will be seen that the digestive action of the whole fruit must be enormous. The activity of this peculiar digestive agent is destroyed in the cooked pineapple, but unless the pineapple is preserved by heat there is no reason why the tinned fruit should not retain the digestive power. The active digestive principle may be obtained from the juice by dissolving a large quantity of common salt in it, when a precipitate is obtained possessing the remarkable digestive powers just described. Unlike pepsin, the digestive

principle of the pineapple will operate in an acid, neutral or even alkaline medium, according to the kind of proteid to which it is presented. It may therefore be assumed that the pineapple enzyme would not only aid the work of digestion in the stomach, but would continue that action in the intestinal tract. Pineapple, it may be added, contains much indigestible matter of the nature of woody fibre, but it is quite possible that the decidedly digestive properties of the juice compensate for this fact.

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